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Improved Bolt Cutter.

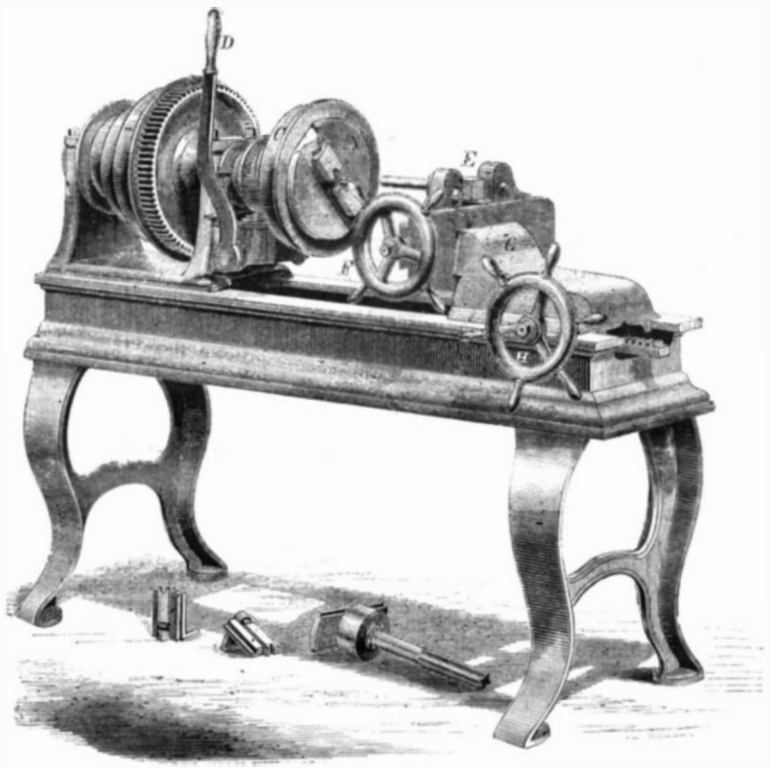
This machine is designed to cut threads on screw bolts, and is intended to simplify and expedite the process as well as improve the quality of the work. There is no strain on the thread in backing off the dies, and the bolt is cut complete at one operation.

Appended is the inventor's description of his machine:—

"The mandrel is hollow, and on the end of it is fastened the face plate, A; to this is fitted two slides, as shown in Fig. 1; these slides have the dies fitted to them. The sliding ring, C, encircles the face plate and prevents the dies from opening while the bolt is being cut. When it is moved by means of the lever, D, toward the cone it causes the dies to open sufficiently to allow the bolt to be withdrawn without stopping or reversing the machine. The jaws for holding the bolt are shown at E, and are operated by means of a right and left-hand screw, cut upon the shaft of the hand wheel, F. The slide, G, to which the jaws are attached, is worked by means of the hand wheel, H, with a rack and pinion. The tap chuck is shown beneath, with a tap in it. In arranging the machine for cutting nuts the slides in the face plate are removed, and this chuck is slipped into the same place. The ring, C, is then moved over the ends, when it is held firmly.

"The nuts are held by the same jaws that hold the bolt, and are cut by running them across the threaded portion of the tap, on to the plain portion, in numbers sufficient to fill the same. The tap is then removed, the nuts slipped off, and the tap restored to its place for further use. The tap is fitted to a square socket in the chuck, and, consequently, can be removed and replaced without unscrewing or screwing up any bolts. This machine will cut bolts of any size, from one-fourth of an inch up to two inches diameter, by once passing over them, cutting the standard number of threads to the inch on all the sizes."

For further particulars and prices inquire of Avery Babbett, of Auburn, N. Y. A patent is ordered to issue on this machine through the Scientific American Patent Agency.



BABBETT'S BOLT CUTTER.

PUDDLING IRON BY MACHINERY.

At the last meeting of the Mechanical Engineers' Society, of Birmingham, a paper was read by Mr. Henry Bennett, of Wombridge Iron Works, on puddling iron by machinery, from which we take the following extracts:—

DESIRABILITY OF THE IMPROVEMENT.

"In the manufacture of wrought iron from the crude pig iron, the purifying of the metal by the process of puddling involves very heavy and long-continuous hand labor, since the metal, after being melted in the puddling furnace, has to be continuously stirred for a considerable time while boiling, in order to expose it thoroughly to the action of the current of air passing through the furnace, so as to effect the chemical changes required for the separation and removal of the impurities originally combined with the iron. The metal has then to be balled up into separate masses of about ¾-cwt. each for the shingling hammer; and the whole process extends over about an hour, from the time of melting the pig iron for each heat, of which six are worked in the day.

"The application of machinery to puddling has long been felt to be very desirable on account of the laborious nature of the process, owing to the continuous heavy work required, and the great heat to which the men are exposed; and the simple mechanical character of the greater portion of the process, which consists in merely a continuous uniform stirring of the material, renders it very suitable in that respect for the application of machinery. But the high temperature of the furnace, and the necessity for not interfering with the current of air passing through it, which has to be regulated and changed as the process advances, cause great practical difficulties in successfully carrying out the application of machinery in place of hand labor.

OBJECT AIMED AT.

"The object of the writer has been to employ machinery simply to aid the puddler by relieving him of the most laborious part of the work, namely, the stirring or working of the metal in the puddling furnace. At the same time the objects aimed at have been, by a more rapid and uninterrupted process of stirring the metal, to shorten the time of the puddling, thereby economizing fuel; to improve the quality of the iron, by rendering the process more uniform and perfect than with hand labor; and to increase the yield of the furnace, by working larger charges than could be both puddled and balled up at one heat by hand labor alone.

DESCRIPTION OF THE MACHINE PUDDLER.

"The ordinary puddling tool or 'rabble' is worked backward and forward in the puddling furnace by a vertical arm outside the furnace, to which it is connected by a notch in the handle of the rabble, dropped loosely upon a pin at the bottom of the working arm. This arm is cottered at top into a horizontal square bar overhead, sliding longitudinally through two guide sockets, and worked by connecting rods from a long T-iron bar, extending horizontally across a whole row of puddling furnaces, the T bar being carried by anti-friction rollers. A longitudinal reciprocating motion is given to the bar by a crank at one end driven by engine power. The guide frame or sector carrying the guide sockets of the sliding bar is centered on a vertical pin immediately over the door of the puddling furnace, and the outer end is moved transversely from side to side with a slow reciprocating traverse along a guiding quadrant, by means of a connecting rod from a crank, which is driven through a worm wheel and a screw shaft, extending over the furnaces alongside the reciprocating T bar. This bar works at a speed of about fifty strokes per minute, and has a length of stroke of 2 feet 10 inches, carrying the rabble with the same length of stroke across the floor of the furnace. The transverse motion given by the crank, which makes one revolution for every seventy strokes of the rabble, causes the direction of each stroke to change gradually between the two extremes of the guiding quadrant, so that the end of the tool, instead of moving backward and forward always in the same line, is worked successively over every portion of the floor of the furnace, within certain limits, in lines radiating from the working hole in the door of the furnace, corresponding exactly to the action in hand puddling. In the double furnace with a door on each, side, two traversing cranks are set at right angles to each other, so that the two rabbles are always working in different parts of the furnace. The whole of the machinery is kept clear above the furnace outside, and completely protected from the heat, and quite out of the way of the men; nothing being exposed to the heat except the rabble or puddling tool, the same as in hand puddling.

"The double furnace is exactly the same in construction in all respects as the ordinary single-puddling furnaces, except that it is made with a working door at each side and is one foot wider inside.

OPERATION OF THE MACHINE.

"When the charge of pig iron is melted and ready for the commencement of the process of puddling, the apparatus is put into action by simply dropping the notch, in the handle of the rabble, on to the pin in the working arm, which is kept continuously in motion by the horizontal reciprocating T bar working overhead. The puddler changes his tool from time to time, as it becomes heated, by simply lifting the notch in the handle off the pin in the working arm and replacing the tool with a fresh one, without stopping the machine; and when the iron begins to thicken, he takes the opportunity of each change of tool to make a few strokes by hand, in order to collect the metal from the extreme sides of the furnace into the center, which is found to insure the whole charge being uniformly worked. The usual time of working with the machine is about 25 minutes with ordinary forge pig iron, the tool being changed five or six times; but with gray iron the time of working is much prolonged. In the latter case the machine is especially serviceable, since the iron keeps in a fluid state much longer, and requires, consequently, so much more working; which causes the labor to be so much more severe in the case of hand puddling that there is great difficulty in getting the men to work any iron that is very

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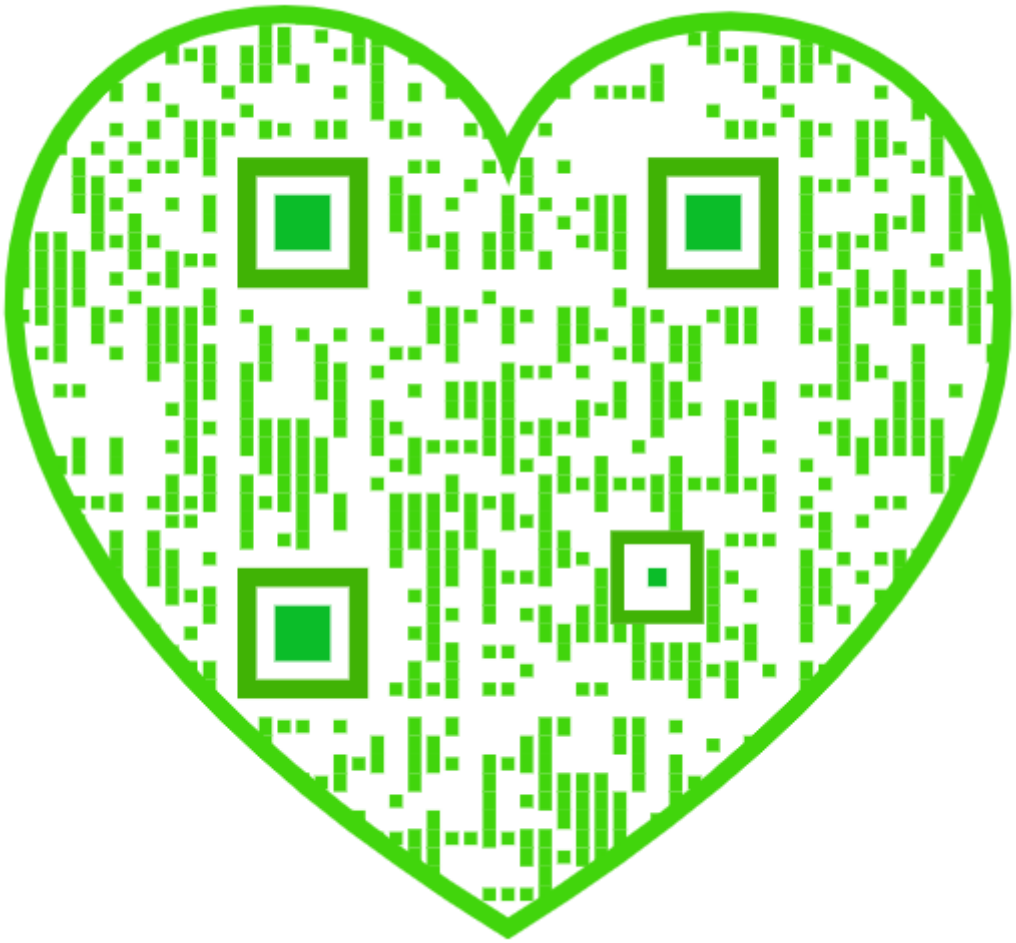

gray. With the machine, however, this causes no increase of labor to the men, and only increases the time of the process.

"When the iron begins to thicken, or, as it is termed, is 'coming to nature,' the machinery is disconnected without stopping it, by simply knocking out the cotter that fixes the upper end of the vertical working arm; the arm then drops out, leaving the furnace door entirely clear for the puddler to ball up the iron, which is done exactly in the same manner as in ordinary puddling furnaces, without the man being in any way inconvenienced by the machinery continuing at work overhead.

ECONOMICAL RESULTS.

"The machine is applied to ordinary single puddling furnaces without any alteration being required in the furnace, the frame of the apparatus being merely attached to the top of the furnace. The double furnace is preferable, however, as it effects a great economy in the consumption of fuel, as compared with a single furnace, and puddles double the quantity of iron in the same time. With the single furnaces at the writer's works, and charges of 5 cwt., the consumption of coal is 28 cwt. per tun of puddled bar made; but with the double furnace and charges of 10 cwt., the consumption of coal is only 17 cwt. per tun of puddled bar, being a reduction of 39 per cent. The number of heats or charges worked in the single furnace is six heats of 5 cwt. each, and, in the double furnace, five heats of 10 cwt. each, per turn of from nine to ten hours. In working the double furnace it is found best to have one puddler only and two underhands, to avoid the division of responsibility that would arise in the case of two puddlers working the same charge of iron.

"The yield of iron in working 5-cwt. charges in the single furnaces is 12 cwt. 2 qrs. 81 lbs. per tun of pig, or 93½ per cent, and with the double furnace working 10-cwt. charges, the yield is 18 cwt. 2 qrs. 9 lbs. per tun of pig, or 93 per cent.

SIX MONTHS' EXPERIENCE.

"Mr. W. Fisher, manager of Mr. Bennett's works, said, in answer to inquiries, that the puddling machines had now been at work constantly during the day for the last six months at the Wor bridge Iron Works, and continued to work as well now as they did when they were first started; and there had been no occasion to repair any of the working parts since then, as the machines had been found very simple and strong. A man went round twice a day, and put a little oil on morning and evening; and they could be worked night and day when desired. At first there had been a little difficulty in introducing the machine; but now the men felt its advantage, and were anxious to have it employed on night work also.

"The six months' experience of the working of the machine had shown that 5 cwt. of iron had been puddled by it in the time that a man would take to puddle 4 cwt.; and it was also found that the machine made a great improvement in the quality of the iron. This was accounted for by the fact that, while in hand puddling there was the liability of the underhands frequently neglecting their work, the machine went steadily on, working the tool constantly to and fro in the furnace, without any intermission, and kept the iron well stirred during the whole time that the work was required to be put into it. The consequence was, that very seldom was a bit of raw iron seen from the puddling furnaces worked by the machine; and the puddling bars were very seldom found to break off short in the rolling, unless the iron were a little too hot. In the heavy operation of puddling, it was impossible for any puddler to stand up to his work as the machine did, since the machine never tired, but kept on steadily at the work without rest, and at a quicker rate of working than in hand puddling. By using the machine to do the heavy part of the work, it was only required for the puddler occasionally to disengage the tool and draw the iron from the sides of the furnace into the center, leaving the machine during the rest of the time to perform its work alone. When the iron was ready for balling up, the puddler came fresh to the work; and from the men being relieved of the severest part of the labor, the furnaces worked by the machine turned out about 5 cwt. at each heat, and six heats during the day, with the same quantity of fuel as was used for ordinary heats only 4 cwt. in hand puddling, with six heats per day. The average result of the day's work with the machine was about 28¾ cwt. of puddled iron from 30 cwt. of pig iron, as compared with about 22¼ cwt. of puddled iron from 24 cwt. of pig iron, by hand puddling. The improvements effected by the machine were, therefore, that it produced a better quality of iron, with a decreased consumption of fuel, and turned out more iron in the same time. The machine did not interfere with the wages of the underhands, as they had to be employed the same as without the machine; whilst the puddler's wages were increased by his being enabled to turn out more iron in the same time."

APPLICATION OF THE SPECTRAL ANALYSIS TO ASTRONOMICAL PHENOMENA.

This was the subject of an inaugural address delivered on the 25th of September, to the Midland Institute, by the President, Lord Wrottesley. As this is the most sublime discovery of the century, the brief history of its progress given by Lord Wrottesley may be interesting.

HISTORY OF THE DISCOVERY.

The celebrated German optician, Fraunhofer, had perceived that the solar spectrum was crossed at right angles to its length by dark bands. Fraunhofer published a description of these, accompanied by a map, in which he represented more than 600 of these lines. Finding that they always occupied the same invariable position on the spectrum, he designated the more important by letters of the alphabet, and the lines so designated still bear his name; thus we say, the line D of Fraunhofer, and so forth. But Sir D. Brewster and M. Kirchhoff have discovered that more than 2,000 of these dark lines exist in the solar spectrum. Fraunhofer observed that when the source of light was changed a different set of lines appeared; but he discovered nothing more. He was unable to account for the appearance of these lines, and, probably, was very far from suspecting the significant part which they would play in future discoveries. Sir David Brewster, and subsequently Professors Miller and Daniell, discovered that certain colored vapors had the power of absorbing the sun's rays, and producing a series of dark bands in the light transmitted through them. In 1822, Sir John Herschel described the spectra of muriate of lime, nitrate of copper, and other substances; and in 1827, in his article on "Light," he states "that the salts of soda give a copious and purely homogeneous yellow, those of potash a beautiful pale violet. The colors thus communicated by the different bases to flame afford, in many cases, a ready and neat way of detecting extremely minute particles of them." Chloride of sodium, or common salt, is so extensively diffused in nature, that it is difficult to procure a spectrum without the line which denotes its presence. The mere stroke of the hand on a garment will throw molecules of this substance into the atmosphere of the laboratory, and thereupon this intensely yellow line immediately appears. In 1835 Wheatstone examined various spectra produced by the electric spark, and in his report to the British Association in that year he says:—"The spectrum of the electro-magnetic spark, taken from mercury, consists of seven definite rays only, separated by dark intervals from each other. These visible rays are—two orange lines close together, a bright green line, two bluish green lines (near each other,) a very bright purple line, and, lastly, a violet line. The spark taken in the same manner from zinc, cadmium, tin, bismuth, and lead in the melted state, gives similar results; but the number, position, and colors of the line vary in each case. The appearances are so different that by this mode of examination the metals may be readily distinguished from each other" It was by experiments of this kind that the new metals, cœsium and rubidium, were discovered by Kirchhoff and Bunsen. The two lines of cœsium in the blue may be seen, when a quantity of the chloride of cœsium not exceeding 1-170,000 of a grain of the pure salt is thrown into the flame by which the spectrum is produced. A distinguished French savant, M. Foucault, to whom I had the pleasure of presenting the Copley medal of the Royal Society in 1855—M. Foucault, in 1849, wrote as follows:—"I caused a solar image, joined by a converging lens, to fall upon the (voltaic) arc itself, an arrangement by which I was able to observe simultaneously the superposed solar and electric spectra; and I observed myself in this manner, that the double brilliant line of the arc coincided exactly with the double black line D of the solar light." Here we have the germ of that glorious discovery, which, if it be completely established, will constitute a new era in astronomy. But M. Foucault failed to perceive the full significance of the words he had traced. Our sun is surrounded by a vast luminous atmosphere, called the photosphere, which envelopes a solid or liquid nucleus; and, arguing from analogy, we may presume that the stars are so formed also. They must at all events be self-luminous bodies, or their light could never reach us. We have now gone through all the preliminary matter, which it was necessary to state before I even attempted to give you some idea of the nature of the method by which we believe we have arrived at that astounding piece of knowledge—the knowledge of many, at least, of the elements of which the sun and stars are composed.

KIRCHHOFF'S THEORY.

The theory is due to the distinguished German philosopher, Kirchhoff, above mentioned. It is stated as follows by Professor Miller:—"The spectrum produced by the ignition of a solid or liquid always yields a continuous band of light, containing rays of all degrees of refrangibility within the range of its two extremes; but the same body, when converted into vapor, may produce a luminous atmosphere, which may emit rays of certain definite refrangibilities only, so as to produce a spectrum consisting of a series of bright bands of particular colors, separated from each other by intervals more or less completely dark. * * * And the same substance, vapor, or gas, has the power of absorbing rays of these identical refrangibilities"—that is, rays whose vibrations are in harmony with their own. "Now, Kirchhoff supposes that in the luminous atmosphere of the sun the vapors of various metals are present, each of which would give its characteristic system of bright lines; but behind this incandescent atmosphere, containing metallic vapor, is the still more intensely heated solid or liquid nucleus of the sun, which emits a brilliant continuous spectrum, containing rays of all degrees of refrangibility. When the light of this intensely heated nucleus is transmitted through the incandescent photosphere of the sun, the bright lines which would be produced by the photosphere are reversed (that is to say, extinguished); and Fraunhofer's black lines are, therefore, the reversed bright lines of which the spectrum, due to the gaseous atmosphere of the sun, would consist, if the intensely heated nucleus were no longer there." This beautiful and most fascinating theory, rife in important results, has not, I believe, been yet universally received, on the ground that it does not explain facts known respecting the vapors of hydrogen and some others; but this has been the fate of all theories, and pre-eminently that of the wave theory of light, which, after a time, was found in harmony with many facts, which at first appeared fatal, and ended by suggesting experiments which proved its truth, and which otherwise had never been made.

KIRCHHOFF'S EXPERIMENTS.

Kirchhoff constructed a delicate apparatus by which the solar spectrum and the spectra given by the various metals could be compared together, and thus he discovered that the dark line, B, in the orange of the solar spectrum corresponds to a line given by the spectrum of potassium; in like manner C in the orange corresponds to hydrogen; D in the yellow to sodium; E in the green to iron; *b* in the green to iron and magnesium; F in the green to strontium (?), iron and hydrogen; G in the blue to iron; H in the violet to calcium. It must be borne in mind, however, that many of the metals have a great many other lines which characterize their spectra in addition to those above named. Thus, iron has seventeen such lines, magnesium three, and chromium three, in the small space contained between E and *b* of the spectrum. By observations of this kind diligently, carefully, and skillfully carried on—that is to say, by a comparison of the bright lines in the spectra of various metals with the dark lines of the solar spectrum, Kirchhoff concluded that the following metals were present in the sun's atmosphere, viz., potassium, sodium, magnesium, calcium, iron, nickel, chromium, manganese, and perhaps cobalt; and Angstrom believes that he has discovered in

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the blue and violet extremity hydrogen and aluminium, and perhaps strontium and barium.

OTHER EXPERIMENTS.

Fraunhofer, in 1823, and Donati, in 1862, had described the spectra of a few stars; but more recently Professor Miller and Mr. Huggins have constructed an instrument with which they have compared the spectra of the moon and planets and some of the fixed stars, and even of the nebulæ with the spectra of the principal metals. Professor Phillips, in his late address, thus describes the results of the observations of the spectra of the moon and planets:—"In the moon and Venus no lines are found due to the atmosphere. In Jupiter and Saturn, besides the lines identical with some produced in our own atmosphere, there is one in the red that may be caused by the presence of some unknown gas or vapor. Enough is ascertained in the case of Mars to discountenance the notion of his redness being due to a peculiarity of the soil." The observations of the spectra of the stars and nebulæ are attended with very great difficulty. Professor Miller and Mr. Huggins, in their paper in the "Philosophical Transactions" of 1864, say that "their light, even when concentrated by an object glass or speculum, is found to become feeble when subjected to the large amount of dispersion which is necessary to give certainty and value to the comparison of the dark lines of the stellar spectra with the bright lines of terrestrial matter. Another difficulty, greater because it is, in its effect upon observation, more injurious, and is altogether beyond the control of the experimentalist, presents itself in the ever-changing want of homogeneity of the earth's atmosphere, through which the stellar light has to pass. On any but the finest nights the numerous and closely-approximated fine lines of the stellar-spectra are seen so fitfully that no observations of value can be made." The telescope employed was a refractor, of 8 inches aperture and 10 feet focal length.

THE RESULTS SO FAR.

The results of these observations up to September, 1864, so far as they regard the stars and nebulæ, may be shortly described as follows:—Owing to the great difficulties above alluded to Messrs. Miller and Huggins are only enabled to present satisfactory results, at least actual increases, in the case of three stars. The spectrum of Aldebaran, a pale red star, has been compared with the spectra of sixteen terrestrial elements; and this star has been found to contain sodium, magnesium, hydrogen, calcium, iron, bismuth, telludium, antimony, and mercury. The spectrum of *a* Orionis, an orange star, is described as the most complete and remarkable yet examined. Strong groups of lines are visible, especially in the red, the green, and blue portions. It has been compared also with the spectra of sixteen elements, and the star found to contain sodium, magnesium, calcium, iron, and bismuth. The spectrum of B Pegasi, a fine yellow star, is closely analogous to that of *a* Orionis. It was compared with the spectra of nine of the terrestrial elements, and the star was found to contain sodium and magnesium, and, perhaps, barium, but, owing to the faintness of the star, and the unfavorable state of the atmosphere, the observations of this star are not so satisfactory as the foregoing. The absence of lines corresponding to hydrogen in the spectra, both of *a* Orionis and B Pegasi, is considered a matter of great interest, "as the lines C and F are highly characteristic of the solar spectrum, and of the spectra of by far the larger number of the fixed stars which have been examined;" and these exceptions seem to prove that those two lines are due to the luminous bodies themselves, and not to the earth's atmosphere. Sirius contains sodium, magnesium, hydrogen, and perhaps iron; *a* Lyræ, sodium, magnesium, and hydrogen. Capella, Arcturus, Pollux, *a* Cygni, and Procyon, all contain sodium, and Pollux magnesium also, and iron; but the observations of these five stars were incomplete at the data above-mentioned. Many other stars had been examined, but their spectra had not been compared with those of the terrestrial elements; all this spectra, however, exhibit numerous lines.

THE SPECTRA OF THE NEBULÆ.

The spectra of the nebulæ are most remarkable, and of great interest to astronomers, owing to the results of their examinations bearing upon what is termed the nebulæ hypothesis, a theory which assumes that all stellar systems, our own included, have been formed from nebulous matter by gradual condensation. Nebulæ, or cloud-like masses of light, had, in some cases, been proved to consist of a cluster of stars closely packed together, by observations made with large telescopes; that is, in the language of astronomers, they had been resolved. Other nebulæ could not be resolved by less powerful telescopes, but had yielded to the superior power of the gigantic reflector of Lord Rosse, and thus it was rendered probable that all these nebulæ consisted of clusters of stars, and that if we both possessed telescopes of greater power, and our atmosphere would permit us to utilize them, they might all be resolved; but the observation of their spectra goes far to refute this assumption. Mr. Huggins commenced by observing the planetary nebulæ—that is, nebulæ which appear circular or oval, and present disks like planets. On examination it appeared that the light of these nebulæ, unlike any other celestial light which had been analyzed by observation of the spectrum, was not composed of light of different refrangibilities, and, therefore, could not form a spectrum. It is for the most part of one color, and after passing through the prisms remains concentrated in a bright line, occupying in the instrument the position of that part of the spectrum to which it corresponds in refrangibility. A more careful examination with a narrow slit, however, showed that, a little more refrangible than the bright line, and separated from it by a dark interval, a narrow and much fainter line occurs. Beyond this again, at about three times the distance of the second line, a third exceedingly faint line was seen. The strongest line coincides in position with the brightest of the air lines, and is situated about midway between *b* and F of the solar spectrum, and is due to nitrogen. The faintest line of the three coincides with F, the line of hydrogen. Sometimes a fourth excessively faint line is seen, as much more refrangible than the line at F, as the latter is more refrangible than the brightest line. Sometimes a faint continuous spectrum appears, due to a bright central point; and sometimes, as in the case of the dumb-bell nebula (4,532 in Herschell's catalogue), only the one brightest line is seen. The appearances above described show that the nebulæ from whence they are derived can no longer be regarded as aggregations of suns of the type of our own. They, or at least their exterior envelopes or photospheres, are probably enormous masses of luminous gas or vapor, for matter in the gaseous state alone emits light of certain definite refrangibilities only. It is noted as a remarkable circumstance that only one of the lines due to nitrogen is seen; and Mr. Huggins concludes his paper with the important and suggestive remark that this may denote a form of matter more elementary than even nitrogen, which chemical analysis has hitherto failed to detect. It is observed by the authors of these valuable communications to the Royal Society, and it is a remark which cannot fail to make a very deep and lasting impression on all inquiring minds, "that the elements most widely diffused through the host of stars, are some of them most closely connected with the constitution of the living organisms of our globe, including hydrogen, sodium, magnesium, and iron. These forms of elementary matter, when influenced by heat, light and chemical force, all of which we have certain knowledge are radiated from the stars, afford some of the most important conditions which we know to be indispensable to the existence of living organisms, such as those with which we are acquainted. On the whole, we believe that the foregoing spectrum observations on the stars contribute something toward an experimental basis on which a conclusion, hitherto but a pure speculation, may rest, viz.: that at least the brighter stars are, like our sun, upholding and energizing centers of systems of worlds adapted to be the abode of living beings.

Shot-making in New York.

One of the most interesting manufactures which this busy city of ours presents to the inquiring mind is that of shot-making, of which most people have no other idea than an indistinct one of a huge and lofty tower through which melted lead falls into a water-pit at the bottom.

A visit to the establishment of the New York Lead Co., on Centre street, will disclose all the details of this interesting process. The brick tower is something less than 200 feet in hight and about 60 or 70 in circumference. At the bottom is a well of cold water, and the summit is entirely devoted to the melting machinery—the pan or sieve through which the shot falls being situated in the center and quite small, say a foot and a half in diameter. The lead is conveyed to the summit in pigs or bars, and there melted. Before being poured into the pan it is slightly mixed with crude arsenic, to prevent oxydation. Much of the lead, in passing through the holes of the sieve, comes out in elongated drops, in the same way as the dripping of water, thus causing imperfect shot, which are increased by the soft shot touching each other in falling, and adhering together.

Standing on the ground floor of the tower, the shot can be seen and heard falling and hissing into the well beneath, the water of which is splashed up high as it receives the driving, seething rain.

From the well, the shot is transferred to a drying machine, lightly rolled by hot flannel rollers, and, after being thoroughly dry, it passes through the next process, which separates the imperfect from the perfect shot. This consists of a long, smooth, wooden inclined plane, divided into regular ledges, each one a little lower than its predecessor, with a slight break or open space of about half an inch between. The round, perfect shot, in rolling down this plane, leap the openings, while the imperfect, not having the same momentum, fall through, and are gathered up to be re-melted.

The next process is separating the different sizes. This is done by a sort of chest of drawers, the top of each drawer being covered by a sieve—the coarser at the top, and thence becoming finer toward the bottom. This cabinet is kept in a swinging motion to and fro by machinery, thus shaking the mixed shot, which is poured in at the top, from drawer to drawer, until all the different sizes are duly assorted into separate drawers.

The shot has now a dull, dusty color, the finer grades appearing more like sand or black meal than a mass of separate and uniform globules; and the next operation is to polish. This is performed by putting it into revolving cylinders, with black lead, and from which the shot is at length projected, bright and shining as beads of glass. It is next put in bags, and is ready for shipment.

The shot business is now very brisk. More is shipped at the present time than for a number of years past. During the war a large business was done in Minie balls, or slugs, hollowed at the but. The trade is now almost altogether in shot, not including the three sizes of buck-shot, which are molded like bullets.

There are four shot towers in New York and vicinity, viz:—The New York Lead Co., Centre street; Tatham & Brother, Beekman street; T. O. Leroy, Water street, and McCullough's Lead Co., Staten Island. The capacity of all these works is very nearly equal, that of the former being from ten to fifteen thousand pounds of shot per day—or a total of forty to fifty thousand pounds.—*N. Y. Tribune.*

A Singular Casualty.

Some three years since, one of the engines of a construction train on the Louisville and Nashville Railroad needed some attention. The engineer ordered Jerry Collins, a common laborer on that road, to go under the engine while it was standing still, but while steam was up, and fasten some screws on the lower side of the engine. Collins obeyed, and while lying on his back with his face toward the bottom of the engine, the engineer, who was at his post on his engine, either carelessly or purposely touched the lever, and allowed steam enough to pass into the cylinder to cause the engine to start. The motion of the wheel instantly cut off one of Collins's legs. A bystander told the engineer of the injury he had inflicted by the forward motion of the engine, when he immediately reversed the motion and run the engine back so far that it cut off Collins's other leg. Being thus made a cripple for life, Collins brought suit in the Circuit Court at Bowling Green, Ky., for $50,000 damages. He recovered a judgment against the Road for $5,500

THE solar heat in a year is sufficient to melt a coating of ice spread over the globe 46 feet thick.

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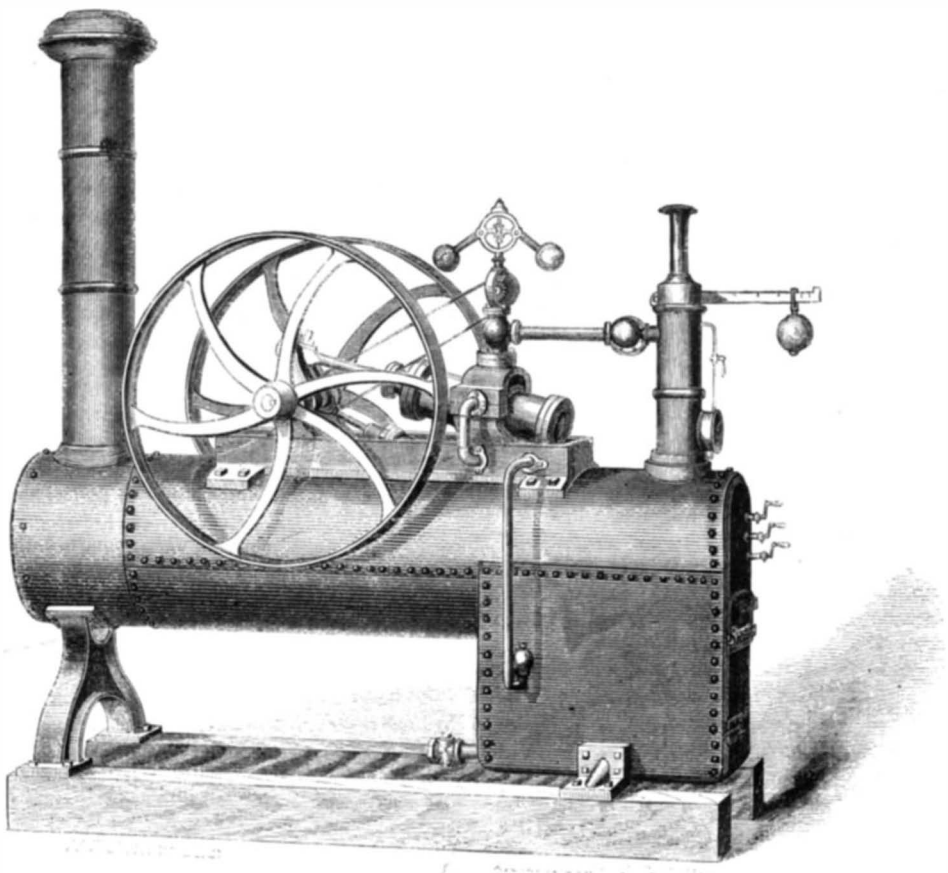
Improved Portable Engine.

This engine is the invention of Mr. Henry T. Carter, and was pateneed through the Scientific American Agency on the 25th of July, 1865. The advantages consist in obviating the leakage of steam from the trunnion, and the simplicity and durability of its working parts. Most of the oscillating engines that have been presented to the public have been constructed so as to take the steam by means of a friction joint on the trunnion or elsewhere. The cylinder, or plate, is kept in its position by means of powerful set screws and springs. These agents are inefficient, and the engine, after a short time wearing, leaks steam. This engine has a tight steam chest and slide valve, so there is no more possibility of its leaking than any slide valve engine. The valve is moved by means of a link and the oscillation of the cylinder. For further particulars of the valve gear we would refer the reader to No. 9 of the present volume of the Scientific American.

The boiler is made of the best material, and the workmanship of the engine is unsurpassed. These engines are made to reverse, when ordered, and are put upon wheels at a little advance of the regular prices.

The strength of the working parts and the lightness of the engine, insures that point which is so desirable in portable engines—safety in transportation.

The prices are very reasonable, and will no doubt attract the attention of parties wishing a good engine. These engines, as well as stationary ones of the same patent, are manufactured by the Winslow Machine Works, Portland, Maine.



CARTER'S PORTABLE ENGINE.

HOW AMERICAN LOCOMOTIVES ARE MADE.

In the Scientific American, page 259 of the current volume, we gave an article from an English cotemporary, which treated at some length on the great locomotive manufactory at Crewe, England, and the processes, or, rather, methods, by which the designs and details are carried out. It must have struck the American mechanic that some of the plans therein set forth were "melancholy and slow," or, in other words, not what we should have expected from a great factory where three thousand men are employed, and where millions of dollars must be invested. It may be pardoned in a small machine shop, where there is a lack of capital, if the proprietor thereof sees fit to plod on in the old and not good way, when there are tools and methods in existence far ahead of those rude ones he sees fit to make use of, but it is not a sign of progress that machines are built to square bolt holes in flanges, or to straighten copper bolts for fire-box stays. All this is just so much time wasted, and attention might better have been directed how to dispense with the square holes, and, consequently, the machine to make them, or the substitution of some other material than copper, which would be equally as good.

The great competition in locomotive building in this country has made a resort to system, or fixed plan of procedure, a matter of necessity. There are no less than twenty noted establishments where quantities of engines are turned out, to say nothing of lesser ones, and repair shops, which do a great deal toward renovating and rebuilding engines. In the best of these large shops the same principle is pursued as in the manufacture of Colt's pistol, or a Springfield rifled musket; that is to say, every engine of its class is exactly like its predecessor, and a cylinder could be made and fitted to a locomotive anywhere with the certainty that it would be right as to its center from the frame, right as to its position on the frame, and of the same dimensions in other respects to insure its proper working.

One of our locomotive shop superintendents, on reading the article on the English locomotive works referred to, said "we could not do much here building engines in that way."

The Jersey City Locomotive Works is a representative shop, and we shall proceed to give some account of the manner in which the principal details are there executed, such as the cylinders, the frames, the drivers and connections. Other parts we are not able to allude to.

THE FRAMES.

These are in two parts for convenience of handling; that is to say, the section which carries the cylinders is bolted to the section on which the pedestals of the driving-wheel boxes are forged. The frames are laid on the planer and faced off, and two sets are thus going on at the same time; the cross-head of the planer being wide enough to carry two tool stocks. The frames are all planed to hardened steel gages, so that the distances and dimensions prescribed by the draftsman are arbitrarily preserved. The pedestal sections are laid one on top of the other on a slotting machine, where the jaws are slotted out together, so that the dimensions and lengths are correct beyond cavil. The two parts, the cylinder sections and that just named, are also bolted together at a fixed distance, so that when the frames are set up they are identical—the bolt holes for the cylinders, brackets, etc., having all been drilled on a press beforehand. On the frame there is a shoulder which the back end of the cylinder flange is fitted against; this shoulder is faced accurately on the planing machine a set distance from the center of the pedestal, and when the cylinder is bolted in place a key is driven in behind it on the forward side, so that it is fast between two solid wrought-iron shoulders, on a solid forging, and can never be displaced or be out of truth.

THE CYLINDERS.

The cylinders are not bored in pairs as in the English works, nothing being gained by that operation as locomotives are here made. They are bored singly, on a machine constructed purposely by Hewes & Philips, of Newark, N. J. The machine consists of a cast-iron bed with a platen laid on top of it. On each end of the bed are two vertical columns which carry shafts, to which boring bars or heads are attached. The cylinder can thus be set on its own bottom as it was planed, and moved any where by means of screws, to be bored accurately. The boring heads are also adjustable by moving a handle, so that in a very few minutes the cylinder can be put in the machine, secured and set; this also by any ordinary workman. The cylinders are faced on the flanges, and turned outside of the same before they are moved from the boring mill.

The cylinders, when on the engine, are bolted to the saddle piece on which the fore end of the boiler rests; they have, therefore, a vertical flange which must be faced off true with the bore. To do this the planing machine is fitted with coned centers—the cones being the diameter of the bore—16 or 18 inches, as the case may be. The cone centers, having been once set, any number of cylinders can be put in and planed off without loss of time in adjusting them.

Moreover, the vertical flange that rests against the saddle, and the valve face, are both planed at one operation, and the cuts are not mincing ones, but the tool takes a good solid chip at first, so that the work is well and speedily done. When the cylinders are bolted to the saddle they are correct, and there is no heavy handling to be done. Formerly, when the cylinders were bolted to the sides of a square smoke box, they were frequently out of center; that is to say, the cylinder had to be made to suit the smoke box of the boiler, and, as it was obviously impossible to rivet that on within a hair's-breadth, much delay ensued. The crank pins could not be turned until it was known where the cylinders were. They were sometimes a sixteenth of an inch in or out, and the shoulders of the pins had to be faced accordingly. All this delay is obviated by the simple means alluded to.

THE DRIVING WHEELS.

The lathe in which the driving wheels are turned is a remarkable machine, and is built by Messrs. Bement & Dougherty, of Philadelphia, Pa., with some additions by Mr. Davis, the efficient superintendent of the Jersey City Locomotive Works.

The wheels are of cast iron, and are mainly completed at one operation; that is to say, at one setting in the lathe, all except the crank pin holes, which are bored in a special machine. The outside or tread of the wheel, the hole for the axle and facing off the hub, are all going forward at the same time. Two wheels a day are turned out complete. Before the wheel is taken off the lathe, the key seat is cut in it by a special attachment. A seat one and an eighth inches wide, and half an inch deep and in length—the depth of the hub—is cut in ten minutes, on an average. In no instance do the cranks exceed one-sixteenth of an inch deviation from being at right angles. The axles are also cut as to their key seats, and when the two parts come together they stay there; there is no fitting and filing, no backing the wheel off, no key seats to be chipped and filed, as in some works. All this is an immense saving of time, while in point of workmanship the quality is unsurpassed.

DETAILS.

In no department of the machine shop can skillful management be shown to better advantage than in the details—in the picking up of the loose ends, so to speak, and the small processes which waste time and add, in no respect, to the value of the work.

In days bygone it was a distinction, coveted by many workmen, to fit up the connecting rods, and all such details as had gibs and keys and brasses. There was

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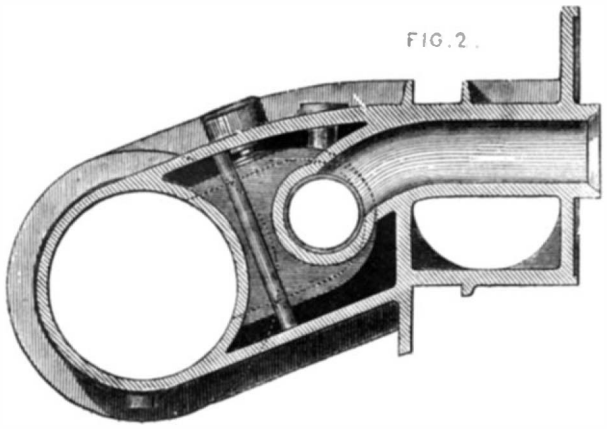
much inspection of joints, much criticism as to the fit of gibs in the jaws, and a nicety of discrimination in regard to the flanges of the brasses where they embraced the strap, that was highly praiseworthy. The long, laborious filing of key ways is a thing of the past; filing and scraping of brasses is also done away with, and when the rods come from the machine the key ways are very nearly perfect, and require little alteration. The brasses fit like a kid glove to the hand, if the workman follows his gage, and the consequence is that where dollars were expended, cents are sufficient.

Messrs. Bement & Dougherty, of Philadelphia, Pa., are the makers of the machine for cutting out key ways in connecting rods, and a more useful tool of its class has not been produced in this century. It is an original conception, carried out in a workmanlike manner. A slotting machine is by no means reliable to make straight key ways. Sometimes the tool springs sideways, and cuts under the center punch marks. In spite of squares and straight edges, the workman is in a measure working in the dark, for one side of his job is always hidden from him. Smoking lamps or stinking gas jets are of no avail to disclose the mysteries of that nether side, and, to his mortification, the skillful artisan sometimes finds that the slotting machine is a delusion and a snare, that fails in time of need. Not so with the machine of Messrs. Bement & Dougherty. The rod, once planed, is put in centers like those of a lathe, and two cutters, in form like drills, but peculiar in shape, on the cutting ends, are set revolving at right angles with the center on the place where the keyhole is to be cut. After these cutters are started, and the machine properly set, they go forward and backward, and work out the keyhole complete without any further attention, except that which all tools working on iron require—that is, to see that no accident occurs to the edges.



The cutters are two in number, and work from each side; they start in solid metal, and no holes are to be drilled previously. They meet in the center when the key way is finished, and they work down and then return, repeating this operation until the job is completed. We regard this machine as one of the most novel, ingenious and useful ever produced for the engineering profession.

In various other details of our locomotive shops a great many changes and improvements have been made of late years, but to dilate upon them at length is more than we can afford space at present. The work of erection—at one time a slow and costly part of the job—is much expedited and rendered cheaper, for no part waits on the other, and when the several details are to be put together they require but little adjustment.

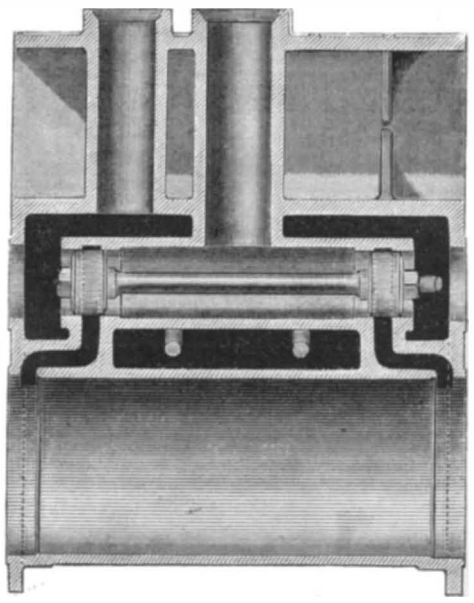
The number of engines turned out in the Jersey City Works is six in a month. This is accomplished with a force of 600 men. It is the calculation to make one engine per month with 100 men, and we are informed that the Company does this.

DAVIS'S PISTON VALVE.

We alluded to the superintendent, Mr. Thomas S. Davis, previously, and we here append illustrations of a new piston valve of his design, which he has applied to locomotives and many other engines on land and sea.

Persons at all conversant with marine or steamboat engines, know what an enormous amount of power is consumed in reversing some of them, particularly those in which the ordinary slide valve is used. Some of the engines of our vessels of war have valves, which, besides being ballanced by a number of extra traps, have an extra engine to each cylinder, large enough to drive a good-sized vessel, solely for the purpose of reversing the engines, and it is a long job, and requires a number of men to do

FIG. 1.



it, at that. These engines are necessarily very expensive, and the cost of maintaining them in a serviceable condition is very great; where a pair of such engines are used in one vessel, the liability to accident is so imminent, as to make the movements necessary to be gone through with, in an action at sea or in entering a port, any thing but agreeable.

By using the valves and case here shown, the inventor is confident he can, and will guarantee, to so improve any engine of this kind, that one man can work the vessel into any position necessary without the help of tugs, and with no more risk than is usual to easily managed boats; the engines shall be entirely under the control of the engineer, and can be handled easily, and reversed instantly, without the loss of time necessary to shut off, or throttle the steam.

The great desideratum of a reduction in the quantity of coal consumed is also accomplished. This is a positive fact, and can be testified to by numbers of owners of vessels. There is no instance on record, where these valves have been applied to old engines, that the consumption of coal has not been greatly reduced. The inventor has never been able to get an engine to alter for the saving in coal for one year, the owners for some reason preferring in all cases to pay a certain specified sum of money for the work done.

Engines to which these valves have been applied may be found in great numbers in the tug boats of New York and Philadelphia and in the Hudson River, at Albany and Troy, and also in larger vessels running from New York to other ports; some of them have been entirely unmanageable, but are now brought into the dock with the greatest ease and celerity.

Fig. 1 is a section of a 12-inch locomotive cylinder, showing the steam-chest ports, exhaust pipes, and method of applying the valves. In this case the cylinder and valve chest are one and the same casting. The cylinders of marine engines are made in a similar manner, much simplifying and lessening the first cost of the engine. The cost of fitting up these cylinders is very slight, the boring bar does the whole of it—simply boring out the short bearings for the valves and squaring up the sides of the ports, all easily and quickly done. The steam enters the outer chest, from the boiler, and almost entirely surrounds the case in which the valve moves, thus insuring an equal expansion of all parts and preventing the sticking of the valves; the full pressure of the steam is exerted upon the outside ends of both valves, and it is exhausted between them—consequently balancing them. This arrangement makes the only truly balanced valve now made; a child can move them without difficulty when they are properly adjusted and cared for. As they are incompressible by the steam, relief valves are inserted to relieve the excessive back pressure when reversing suddenly. This is absolutely necessary on a locomotive cylinder, but is not so necessary on any other kind of an engine.

Fig. 2 is a section of the same cylinder through the center of the exhaust pipe, and shows the arrangement of the ports, valve case and relief valves. The pressure of the steam in the exterior of the case keeps the latter closed. They are placed over each port and have a small spring over them to insure their closing.

When the back pressure in the cylinder becomes greater than the pressure in the chest, the valves open, and the steam or water, or both, are discharged into the steam chest. The water falls to the bottom and is discharged by cocks inserted for that purpose.

FIG 3

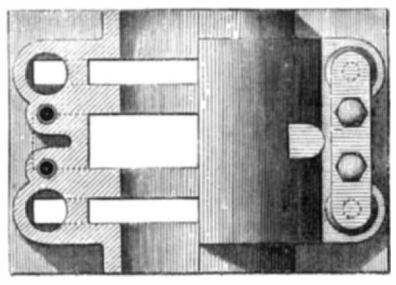


FIG. 4

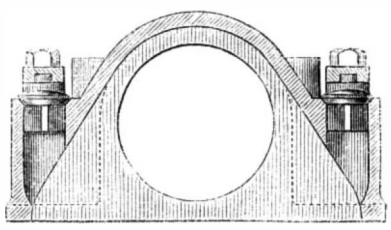


Fig. 3 represents a partial section and top view of the valve case as made and applied to the valve face of the ordinary slide-valve cylinders. This one was made for a locomotive, but those for marine engines are made in the same manner, except that they have no relief valves. In some cases, where the valves removed have approximated in size to barn doors, two or more valves have been used, placed side by side and worked by one valve stem. The inventor has found this manner of using them better than to make the valves very large in diameter; they take less room and give all the area requisite.

Fig. 4 is a section through the center of the port of the same valve case.

FIG. 6.

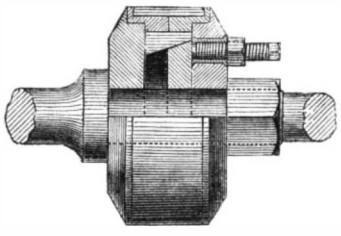
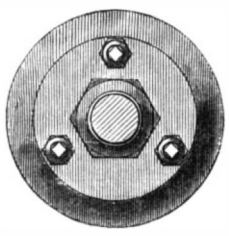


FIG 7.



Figs. 6 and 7 represent the valves, showing the manner of placing the rings together, one inside of the other; they are all cut in one place, and so put together as to break joints, with dowel pins to prevent their getting out of place. The cheeks or followers are held together by the shoulder upon the valve spindle and the nut; they are fitted to the spindle, and also to the shoulder or recess in the rings, and are made to fit the bore of the valve chest as nearly as possible, leaving the extreme periphery as thin as it will stand. Through one of the followers are screwed set screws of any number desired—three are generally used. In very small valves the set screws are left out entirely, and the cone is forced into the rings by

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placing a thin piece of metal or other material, between the cone and the follower, and screwing the nut up until the follower comes to a bearing upon the recess and edge of the rings; this answers all practical purposes, and is some cheaper. The conical plug is solid, and is fitted to the valve spindle and also into a ring which is made conical upon its inside periphery; outside of this ring are placed two rings, alike, but reversed; they are recessed on their outside edges to give a bearing for the followers; the outside ring is made a little wider than the port, otherwise it might spring out and catch when passing it; its edges are slightly bevelled, being a little wider upon its interior periphery to allow the two-joint breaking rings to grasp and retain it. The action of the arrangement is this:—By screwing up the set screws or nut, the solid conical plug is driven into its surrounding conical ring, which, being cut, is expanded, and through it the surrounding rings are also expanded, at the same time the distances from the center of the valve to any point or points of its exterior periphery are all equal, or the outside of the valve is true to the center, and the valve has all the advantages of a solid block, without the disadvantage of being obliged to insert new valves when they begin to leak.

These valves have been in successful use for the last four years, and the inventor has yet to hear of a case where they have not accomplished their object thoroughly. There are great numbers of vessels now running about, and from our harbors, which are wasting money for their owners almost as fast as they can earn it, and to all who own such vessels, the inventors wishes to say if they will call upon him he will satisfactorily demonstrate that they are wasting money, and will show them what he has done and can do to save it for them. Address Thomas S. Davis, Jersey City Locomotive Works.

Correspondence

Award of Premiums at the American Institute Fair.

Messrs. Editors:—When we put our machinery on exhibition at the late Fair of the American Institute, and thereby contributed a share to make it interesting, we did it in the simple belief that, according to the programme by which they solicited our contribution, entire impartiality would be shown in the distribution of prizes; and that, as they explicitly stated, no premiums would be given, directly or indirectly, to any member of the Board of Managers of the Fair, or any Committee or officer of the Institute. It has, therefore, surprised us not a little to find that, in direct contradiction to their public announcement, two of the managers have received—if not directly, at least indirectly—the first premiums, that on steam pumps was awarded to the Woodward Steam-pump Company, of which, we suppose, Mr. Geo. M. Woodward is the principal; and on oscillating engines to Messrs. Wm. D. Andrews & Bro., whose superintendent or partner is Mr. David G. Starkey, who, together with Mr. Woodward, was a prominent member of the machinery department.

You, Messrs. Editors, as impartial judges, must acknowledge with us that this thing looks dubious, to say the least, and ought to be inquired into, in order that exhibitors, and the public in general, may know in the future how much value they can attach to the judgment of the American Institute, which they pretend to express through their premiums and awards. A. & F. Brown & Co.

Progress Machine Works, New York, Oct. 25, 1865.

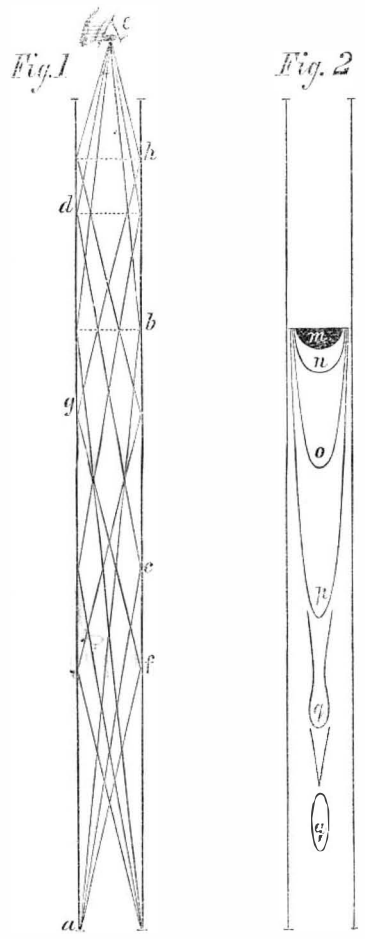
The Way to Zinc Cast Iron.

Messrs. Editors:—For the information of E. D., and others, I place at your disposal some experiments made by myself in galvanizing small cast-iron articles, such as gears and other small parts of machinery. I heated the castings to be galvanized to a red heat; I then plunged them into a bath of clear muriatic acid, to detach the scales and to thoroughly clean them; they are then immersed in a bath of melted zinc. As soon as the iron has attained the melting heat of the zinc they are removed. In this way I have made some beautiful galvanized castings. Great care should be taken, or in plunging the articles into the zinc, while wet, the zinc will be thrown in the face of the operator. The zinc should be covered with sand, and the casting must be immersed very slowly. E. H. Hill.

Worcester, Mass., Oct. 14, 1865.

Straightening Gun Barrels Illustrated.

Messrs. Editors:—In your issue of 9th Sept. last, a correspondent asks for a statement of "the theory of the process of straightening gun barrels by looking through them at the light." The process referred to is, no doubt, that which is called by the workmen "straightening by the shade." This art is based upon a beautiful group of scientific facts or principles, and is, therefore, one of much scientific interest. It is also an art of great practical value, because it affords the means of straightening the barrels of fire-arms with a far greater degree of precision than is attainable, or even approachable, by any other process. The theory of the art, if I mistake not, is little understood even by those who practice it successfully; and, so far as I know, it has never been satisfactorily set forth, and explained in any work. I therefore offer, for the Scientific American, a brief exposition of the process, and of the scientific principles involved in it.



When the eye looks into a gun barrel, as shown at *e*, Fig. 1, the interior surface appears to be spread out into a plain circular disk, as far from the eye as the other end of the barrel. Through the center of this disk is a circular orifice, and surrounding this, at equal distances from it and from each other, respectively, are four or more well-defined concentric circles, dividing the disk into as many bright concentric rings, each of an apparent breadth, precisely equal to the diameter of the central orifice. The central orifice is the other end of the caliber as seen by direct vision. The several concentric circles are so many images of the end of the caliber reflected to the eye from different points along its length. The first of these circles, or that nearest the central orifice, is an image formed by light once reflected. The second, third, fourth, fifth, etc, respectively, are images formed by light reflected twice, three times, four times, five times, etc. In order to see how these images are formed, and to find their respective loci in the caliber, consider that a ray of light from each point in the end of the caliber, as *a*, may pass to some point, *b*, on the other side of the caliber, and be thence reflected to the eye, thus forming, at *b*, an image of the end of the caliber by one reflection. Another ray from the same point may pursue the route, *a c d e*, forming an image at *d*, by two reflections. Another ray may take the route, *a f g h e*, forming an image, at *h*, by three reflections—and so on for the other images. Now, since, in the formation of each of these images, respectively, the angles of incidence and reflection are equal, it follows that the locus of the image, *b*, formed by one reflection of light, is at one-third of the distance from the eye to the further end of the caliber; that formed by two reflections, *d*, is at one-fifth; that by three reflections at one-seventh, and the succeeding ones one-ninth, one-eleventh, etc., of the same distance.

Hence we see that all three images are located within the third part of the length of the caliber nearest to the eye. Consequently there are two-thirds of the entire length of the caliber in which none of these images appear. It is to this part of the caliber only that the workman directs his attention, for it is here only that he can cause the "shade" to appear which discloses the crooks in the caliber, if any exist. When this part is straightened he inverts the barrel and works from the other end.

When we would examine a plain mirror for the purpose of ascertaining whether its reflecting surface is a true plane, we cause objects to be reflected from it to the eye at small angles of incidence. If, under these circumstances, every part of the mirror gives an image true to nature, we pronounce it perfect; for the slightest deviation from a true plane, would cause a manifest distortion of the image. In the process of straightening gun barrels by the shade, crooks in the caliber are detected upon the same principle. The internal surface of the barrel is a mirror, and whatever objects are reflected to the eye from that portion of it that lies beyond *b*, will be reflected under very small angles of incidence. It is not a *plain* mirror, to be sure, and therefore the reflected image will not be true to nature. But if the caliber be straight, the image will have no other than that normal distortion which is due to the transverse or cylindrical curvature of the mirror; while, if there be longitudinal flexures also, there will be an abnormal distortion of the image which will reveal the defect.

Having thus presented the theory of the process in a general form, we will look for a moment at its practical application.

The workman fastens a piece of board horizontally across a window at a distance of 10 or 12 feet from his working stand point, the lower edge of the board being straight and six or eight feet above the floor. This we will call the shade board. He fastens another strip of board to an upright post or other object near his stand point, having, in its upper edge a notch in which he may rest one end of the barrel while he looks into the other. He places one end of the barrel on the rest and directs it at the window a few inches below the shade board; then looking into the caliber, and directing his eye to the lower side of it and to the point just beyond the image, *b*, he gradually depresses the end which he holds in his hand, bringing the direction nearer and nearer to the shade board. Soon he sees a dark shade, as shown at *m*, Fig. 2. This is the reflected image of the shade board; the curved part of its outline being the image of the straight edge of the board. As he depresses the end more and more the shade lengthens to *n o p*, etc. If the caliber be perfectly straight, the shade will always maintain a true and symmetrical parabolic form, growing more and more pointed at its apex, until it reaches the further end of the caliber. But if there be the slightest flexure in the caliber, the barabolic figure of the shade will be distorted. As soon as the workman discovers a distortion of the figure, he slowly revolves the barrel about its axis with his fingers, at the same time alternately elevating and depressing it slightly, until the shade assumes a form in which the two sides near the apex are equally drawn in toward each other, as shown at *q*; (or if the crook be considerable, the two sides may be drawn quite together, cutting off a portion of the shade at the apex, as at *r*). He now knows not only that there is a crook at *q*, but also that the caliber is concave downward at that point. If he is an experienced workman he will be able to judge correctly how far that point is from his eye; and he will reach

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his hand forward, and put his finger on the under side of the barrel at the precise spot where pressure or a blow must be applied to correct the defect.

B.

New Haven, April 18, 1865.

Zincing Cast Iron.

MESSRS. EDITORS:—A correspondent of the SCIENTIFIC AMERICAN states a difficulty in galvanizing cast iron, and at the same time exhibits his process.

The use of chloride of zinc as a flux in covering cast iron with zinc will surely defeat him as often as he tries it, for it is decomposed by a heat considerably less than the melting point of zinc. But for tinning, at a heat of about 450°, it may be used with great advantage in combination with sal ammoniac (chloride of ammonium). Thus, to a saturated solution of chloride of zinc, add to saturation sal ammoniac—decant it clear; and I would recommend the addition of an equal bulk of distilled or rain water with this compound, clean, or sometimes—with tact—dirty metal will become tinned without friction, except iron and steel.

These latter metals being perfectly clean, may sometimes be tinned with the aid of this double chloride without friction, but always with, preferably, a brass wire or brush.

I suspect that the lack of success of your correspondent is due to a failure in presenting the iron to the zinc chemically and perfectly clean. The dilute sulphuric acid should be thoroughly washed off in hot water, so that, as well as being clean, the cast iron will be instantly dry, and the whole process should be finished at once. There are, however, various means of preventing the oxydation of the metal for a short time, if necessary, with which he is doubtless acquainted.

R. H. A.

Baltimore, Md., Oct. 16, 1865.

An Acknowledgment.

MESSRS. MUNN & Co.:—Your letter, together with my French patent for knitting machines, is received. Allow me to return you thanks for the very satisfactory manner in which you have thus far conducted my business. I have received my patent from the United States Patent Office for setting up apparatus for knitting machines, granted Sept. 12th, and have read notice of allowance of my other case, in two weeks time, making two American and one French patent received through your hands during this month—the three aggregating the large number of thirty-five claims.

You have already successfully conducted my business in every case entrusted to you, having secured for me five separate patents. You have three more cases for the United States belonging to me yet in your hands, and I anticipate sending three or four more to you during the year. You have, in short, given most *perfect* satisfaction in every case, for which you have my hearty appreciation,

I. W. LAMB,

Office of I. W. Lamb's Knitting Machine, Rochester, N. Y., Sept. 26, 1865.

[Mr. Lamb has patented in this country and some foreign countries several valuable improvements in knitting machinery.—EDS.

The Most Reasonable Explanation of the Razor Question.

MESSRS. EDITORS:—Having observed in your valuable paper the controversy as to whether a razor cuts better when hot, I will give you my reasons, aside from my experience, for believing it does. I cannot agree with the gentleman that the expansion of the razor by heat would contract its teeth, but believe they must be affected the same as the razor. The reason of its cutting better when hot is from the dissolving or softening power of the heat that it gives off to the beard when the hot edge of the razor comes in contact with it in the drawing cut; hair being of the same nature as horn is effected by heat in the same manner—heat softens it. When boiling hot it may be cut as easily as cheese; when cold it is very hard. Yet in this state, I believe a tool heated to a degree that would still preserve its temper would cut much better than a cold one. I have used them without temper. A given degree of heat would cause a tool to melt its way through a piece of horn. A hot knife will readily sink of its own weight into a lump of hard butter, which, when cold, it would have made no impression on.

RICHARD LEWIS.

Williamsburgh, N. Y., Oct. 17, 1865.

The Teeth of Wheels.

MESSRS. EDITORS:—The pitch of a gear is the distance between the centers of two adjacent teeth, measured in a straight line; and these centers are all situated in an imaginary circle, called the "pitch circle." In treating of gears, it is customary to consider the pitch as an arc of this circle instead of a straight line or chord, and the rules usually given for proportioning the number of teeth, and the diameter of the pitch circle, are based upon this assumption. When the number of teeth in the gear is large, or where the gears to be matched are of the same size, or nearly so, these rules are sufficiently accurate for practice, but every mechanic who has had occasion to make gears of differing sizes mesh together, particularly if of coarse pitch, has found that teeth determined by circular pitch will not run properly, and he has been compelled in such cases to find the true diameter by a series of trials. The less the number of teeth in a gear, the greater the disparity between the true and the circular pitch. If there are but three teeth, to take an extreme case for an example, the variation amounts to over twenty per cent of the true pitch.

For some time past I have used the following formulæ for determining the diameter of the pitch circle—the true pitch being given, and *vice versa*, and find them simple and convenient:—If n represent the number of teeth; p the pitch, and D, the diameter of the pitch circle, then

$$\frac{p}{\text{nat. sin } (180 \div n)^\circ} = D \quad \text{and,}$$

$$\text{nat. sin. } (180 \div n)^\circ \times D = p.$$

Or, in the form of rules:—

Divide the given pitch in inches by the natural sine of one-half the angle subtended by a tooth and space, and the result will be the diameter of the pitch circle in inches.

And—

Multiply the natural sine of one-half the angle subtended by a tooth and space, by the diameter in inches, and the product will be the true pitch.

With a table of natural sines at hand, these rules will be found to be of ready application, and gears proportioned by them will run properly in all cases.

It will be observed that the diameters of two gears having the same pitch are not in the exact proportion of the number of teeth, as is generally taught. For example, take two gears, of $2\frac{1}{2}$-inch pitch, one with twelve, and the other with ninety teeth, their pitch diameters, as determined by the above rule, are respectively 9·66 and 71·64 inches, being in the proportion of one to 7·416, while the proportion of the number of teeth is as one is to 7·5. Consequently the formula,

$$n \times p \times .32 = D$$

given by Haswell is incorrect, as it ignores that fact. In the case of the two above-mentioned gears, Haswell's formula makes the lesser one $\frac{1}{16}$ths of an inch too small, and the larger $\frac{3}{8}$ths of an inch too large.

G. H. BABCOCK.

Providence, R. I., Oct. 8, 1865.

FOREIGN SUMMARY.

HISTORY OF COKE.—The following advertisement given in "Notes and Queries," fixing the period when coke first came into public use in this country, will no doubt be acceptable to any future historian of our coal trade:—"There is a sort of fewel made by charking or calcining Newcastle coals which burns without smoak, without fouling the furniture; and altogether as sweet, and is much more lasting and profitable than wood or charcoal; it kindles suddenly, and is useful either for chambers, roasting of meat, drying of malt or hops, woolcombing, distilling, preserving, or any such like employment. His highness the Lord Protector, with the advice of his Council, have encouraged and authorised the making thereof in order to the preservation of the woods of the nation. If any shall desire to make tryal of it for any of the use aforesaid, which will cost little or nothing the experiment, they may repair to London at Northumberland Wharff, near Chearing Cross; and according to the satisfaction they receive therein, they may be supplied from time to time with what quantity they shall have occasion to use. Those that have made tryal of it, finde it very profitable to all those uses abovementioned. It is also very useful for the tobacco pipe burners."—*Public Intelligencer*, No. 139, from Monday, August 16, to Monday, August 23, 1658, p. 764. This advertisement appears also in the succeeding number for August 30, but apparently not in any of the previous numbers.—*London Artizan.*

IMPROVING CITIES.—A paper on "improvements applicable to the City of London and other large towns to improve health and preserve life," by Mr. G B. Galloway, was read at the recent meeting of the British Association, in which it was suggested that the Corporation of London or a joint-stock company should purchase all bad-house property and rebuild the houses on an improved plan, a part of which would be the placing of iron bridges across the streets at intervals from one house to another as a means of avoiding crossings. Further facilities for crossing the Thames, and extra footways on the outside of the bridges, were suggested. As regards the purifying of the air of the streets, it was advised that at every window in every house and in every open space plants and flowers should be grown.

THE water pipes in several parts of Paris are being replaced by tubes of a larger caliber. This operation is being performed at present on the Pont au Change and the Pont St. Michel. These tubes are placed either under flags or under paving stones covered with cement. All along the Boulevard du Palais the water pipes are placed in the sewers. When the subterranean canalization of Paris is completed, the sewers will inclose not only the water and gas pipes, but likewise the electric wires by which the telegraph offices communicate with each other.

AT a recent meeting of the Horological Institute, Lord Caithness in effect declared that the art of clock making was going out of England. Statistics prove that France and America are doing for us the work which we should do and profit by at home. From Switzerland especially the importation of watches, from France of Ormolu clocks, and from America brazen clocks, has, of late years, enormously increased, and this cannot be without its effect upon our artisan classes.—*London Artizan.*

TRACTION CARRIAGE.—The specification of Messrs. Bernier & Godard Desmarest's invention describes a steam carriage, in which the motive power, instead of being imparted to wheels, is transmitted by cranks to a set of legs, having an alternating or rising and falling motion, and bearing at the down stroke against the ground, rail, or surface to be traveled over, so that they propel the carriage in a manner somewhat similar to the action of the legs of a horse. An arrangement of rods, working in slotted brackets, and actuated in levers, is also described for bringing the legs in and out of action.

PROF. WHEATSTONE ascertained that the duration of the electric spark does not exceed the twenty-five thousandth part of a second. A cannon ball would appear stationary in its flight if illuminated by the spark, and the wings of an insect that move ten thousand times a second would seem at rest.

ACCORDING to Prof. Bottger, the mixture of cotton with linen may be detected by unraveling a piece of the tissue, both warp and weft, and plunging it into a solution of aniline and fuchsine. It should be taken out, washed, and, while moist, dipped in ammonia. The cotton threads will then lose their color, while the linen will remain red.

DR. SJOGREEN, a Swedish naturalist, states that the particles of pure iron found in the Swedish lakes result from the deoxydizing action of certain insects. Their larvæ absorb oxygen from the oxide of iron and form a cocoon of pure metal.

THE presence of a one hundred thousandth part of phosphorus may be detected in a body by Mitscherlich's process; and Dr. Herapath has found it perfectly possible to discover the ten-thousandth part of a grain of strychnia in solutions.

FROM analyses of cows' milk it has been discovered that the quantity of butter present in the evening milk is more than double that of the morning. The quantity of sugar of milk is greatest at mid-day, and decreases towards evening. The albumen, caseine, etc., remain almost constant.

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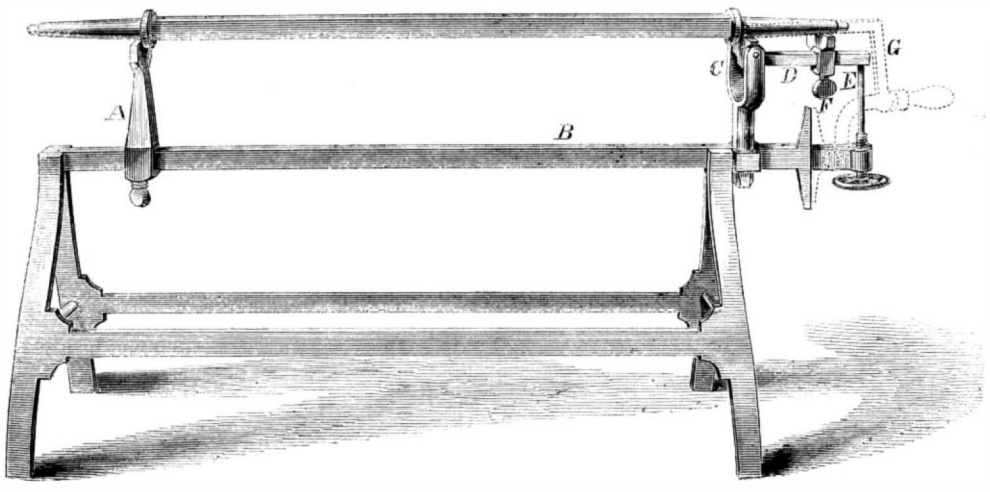
Improved Axle-setting Machine.

Axles for carriages are generally made by the quantity in large factories, the ends alone being furnished, they being lengthened by a piece in the middle, and welded together by the purchasers. In welding them, care must be taken to set the ends the wheel runs on perfectly true, in line with each other, otherwise the wheels will stand in or out of a vertical line, as our readers have seen in some shackly old country wagon. This machine is intended to make the process of setting the axles true, expeditious and certain, and is well arranged to that end. Any length or taper of axle can be set in a few minutes.

Fig. 1



GORTON'S AXLE-SETTING MACHINE.

In itself the machine is quite simple, being merely two uprights, A, on a frame, B. These uprights are adjustable by set screws at any distance. The upright, C, has a jointed bar, D, projecting from it, which rests on a screw rod, E. This bar is a straight edge, to show the taper of the axle; for when the same is placed on the uprights, as shown in the engraving, and the stop, F, brought up to it by the screw, the taper will be given by the gage, G, shown in dotted lines. If the axle does not touch the stop, F, it is too high on the end, and must be brought down by the blacksmith. If it touches at the end and not at the shoulder, it is too low, and must be treated accordingly. The axle is then turned end for end, and the operation is repeated. The T end on the frame is to set the T foot of the gage against, as shown. Fig. 2 illustrates the manner of obtaining the angle of the gage. The foot is set against the spoke, and the straight edge, H, is put in the axle box. This is a very useful machine, and will be of great assistance to wagon manufacturers.

This invention was patented through the Scientific American Patent Agency July 25, 1865, by John Gorton, of Providence, R. I. For machines or State rights address him at No. 107 Cranston street, that place.

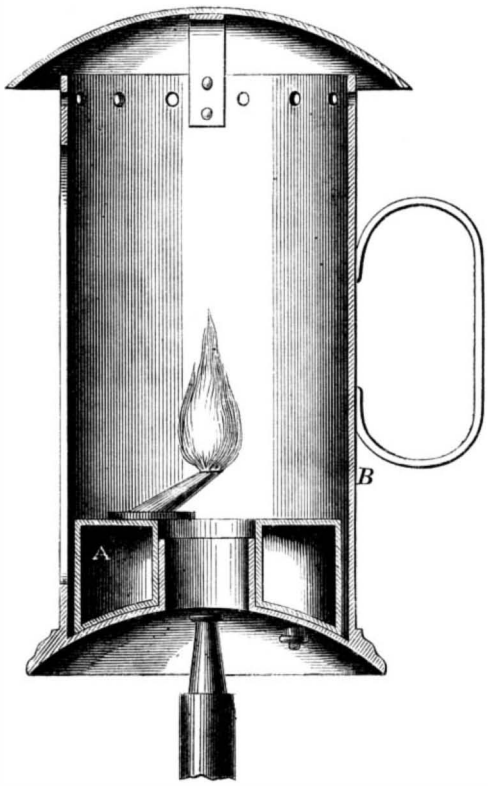
Iron Cow Stalls.

Our agricultural readers may be interested to learn the details of the new iron cow stalls in use abroad—similar contrivances being partially introduced in this country The stalls are formed of strong division plates of cast iron, the front having a round dwarf column which offers a smooth surface to the cattle when turning in or out; and each cow is fastened by the ordinary chain passing round the neck, the end of which slides up and down, a vertical iron rod attached to the stall division. The troughs or mangers are of cast iron, the whole length of the stall, raised a few inches above the level of the pavement, and are combined with the stall division in such a manner that water emptied into any one trough will flow along the entire range.

The fodder is contained in a wrought-iron rack, raised about a foot above the trough, and has open rails at back as well as in front, to expose the fodder to the action of the air. The advantages claimed for these improvements are, the stalls are more durable than can be attained by any other means, very compact, easily cleaned, and will not harbor contagion; the arrangement is convenient, and facilitates dispatch in feeding; the cattle have a greater relish for their food, and the fodder never gets damp or heated. Fresh air inlets are placed in front of each cow, and a feeding passage for trucks runs along the heads of the stalls. The doors are of flagging and asphalt or brick.

HARPER'S GAS LIGHTER.

Where many gas gets have to be ignited—as in public buildings and street lamps—much time is generally wasted, and quantities of matches consumed during the operation. It will be conceded that the lamp shown in the engraving is a great improvement on the common way of doing the business, being much more expeditious, cleaner, and more economical. With these recommendations it should certainly become popular. In order to light a gas jet with this device, it is merely necessary to set the lamp over the burner, as shown, when the flame of the lamp communicates with the gas, and lights it at once.

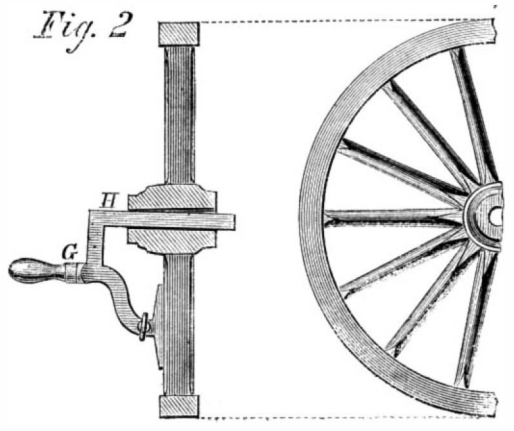


In construction, the device is simply a spirit lamp, A, set in a case, B. This case has an orifice at the bottom, which is placed over the burner with the result already alluded to. The lamp can be trimmed through a door in the case, and is protected from the weather. Thie is a convenient affair, and was patented through the Scientific American Patent Agency, by John G. Harper, on July 25, 1865. For further information address the patentee at the Metropolitan Gas Works, foot of 42d street, North River, New York.

Petroleum in Europe.

It is stated that petroleum has been discovered in Hanover, and capital is being privately subscribed in England to raise the oil from the wells, which are reported to be numerous. The constantly increasing importance of the trade in mineral oils at Marseilles, too, attract attention to the oil deposits of Europe. It is now considered certain that, in a period more or less short, the old continent will not be tributary to America for mineral oils for lighting. Every day new natural reservoirs of petroleum are discovered; and at the same time geologists are beginning to understand oil fields better, and the manner in which they are distributed over the globe. Among the localities which already export petroleum, is Moldo-Wallachia. Havre is the principal French market for petroleum. The *Marseilles Semaphore*, however, is of opinion that Marseilles, is destined to become a large market when the European reservoirs shall be worked on a large scale, and when it can receive the mineral oils of Asia by the Isthmus of Suez. There is an intimate connection between the reservoirs of petroleum in Gallacia and Moldo-Wallachia. These two oil regions, in fact, only form one, which corresponds to the general line of the Carpathian mountains—*London Artizan.*

Fig. 2



MARKET FOR THE MONTH.

The leading events in the commercial world for the past month are, a great speculation in cotton at Liverpool, an advance to seven per cent in the rate of interest by the Bank of England, a speculation in grain at Chicago, and a rapid extension of the credit system in our dry-goods trade. We look for a collapse in both speculations, and ultimate heavy losses by those who are granting large credits in our inflated currency. Prices at the last of October compare as follows with those at the end of September:—

	Price Sept. 26.	Price Oct. 25.
Coal (Anth.) ₩ 2,000 lb.	$12 00 @12 50	$13 00 @13 50
Coffee (Java) ₩ lb.	29 @ 30	32 @ 34
Copper (Am. Ingot) ₩ lb.	32½@ 33¼	31½@ 33¼
Cotton (middling) ₩ lb.	44 @ 45½	57 @ 60
Flour (State) ₩ bbl.	$7 60 @ 8 35	7 80 @ 8 75
Wheat ₩ bush.	2 15 @ 2 50	2 40 @ 2 80
Hay ₩ 100 lb.	60 @ 65	60 @ 65
Hemp (Am. drs'd) ₩ tun.	325 0@350 00	310 00@325 00
Hides (city slaughter) ₩ lb.	11⅓@ 12	11½@ 12
India-rubber ₩ lb.	36 @ 70	35 @ 75
Iron (American pig)		49 00 @50 00
Iron (English and American refined bar)		125 00@130 00
Lead (Am.) ₩ 100 lb.	9 50 @ 9 62½	10 00
Nails ₩ 100 lb.	8 00	8 00
Petroleum (crude) ₩ gal.	38 @ 38½	37 @ 37½
Beef (mess) ₩ bbl.	9 00 @15 50	11 00 @17 00
Saltpeter ₩ lb.	22	22
Spelter (plates)		10¼@ 10⅜
Steel (Am. cast) ₩ lb.	13 @ 22	13 @ 22
Sugar (brown) ₩ lb	11¼@ 17½	13 @ 19
Wool (American Saxony fleece) ₩ lb.	75 @ 77	75 @ 77
Zinc ₩ lb.	14 @ 15	15 @ 15
Gold	1 44	1 46¼
Interest (loans on call)	5 @ 6	7

Work upon the Chicago lake tunnel is to be carried on through the winter, and provisions, coal, and stoves have been carried out in tugs to warm and comfort the laborers in the cool depths. About thirty-five men will winter in the crib.

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NEW YORK, SATURDAY, NOVEMBER 4, 1865.

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APPRENTICES AND JOURNEYMEN.

A statement has been extensively published that the "New York Convention of Trades' Societies, now in session at Albany, are considering the subject of regulating by law the relations of apprentices to journeymen." This means, we suppose, for no explanation is given, that apprentices are to be bound for a certain period, or otherwise compelled to serve masters or at trades which they abhor.

It is stated that the object of this action on the part of the Society is to advance the interests of the workingman; make him more proficient in his business; to correct the evils of half-bred mechanics—in a word, to relieve any trade from the odium it has incurred by inefficient members, and supply it with good ones. Such objects are extremely praiseworthy, but they are unattainable by the means proposed. Men cannot be legislated into skillful mechanics. It is an old saw that "one man can lead a horse to water, but forty cannot make him drink." So if a youth has no natural aptitude for his business, a law cannot enforce what nature has denied him. Laws cannot make poets, or painters, or machinists; and the talent of good workmanship, though not down in the calendar of virtues, is as much of a distinction as any in the gift of the muses. It is intended to "regulate" mechanics by law; to legislate their talents down to the level of others who are naturally mediocre, and forbid them to exercise their own views, or opinions, or talents, except at the will of their masters. What preposterous folly! The capital of an employer is his bank account. The capital of a mechanic is his hands and brain; the mechanic is hidden in the apprentice, and develops by judicious encouragement and treatment—not by being kept down at the bidding of any worshipful society of tradesmen in the world.

If a youth is naturally uneasy and restive, restraint will not improve him; compulsory daily attendance on his trade will not cure him. It is idle to suppose that manual dexterity can be secured by law; to assert that a mechanic can fit in a gib and key neatly because some legislators say he must. In India mechanics are regulated by law. He whose father was a tailor must be a tailor also. Caste, the social barrier, prevents him from being any thing else. What is the consequence? The workman receives a beggarly pittance, and the product of his toil is the rudest.

In the State prison are men who make shoes on compulsion, but we never heard that they were specially skilled in their art; that the goods they made were other than the commonest, or that they were devoted to their occupations. The surest way to break up any trade—to destroy a spirit of progress—to reduce mechanics to human machines—is to regulate them by law. Let them alone! More work is obtained from one willing apprentice than from a dozen compelled to labor; and if the Society of Tradesmen study their own and the public interest they will seek to procure youths who *desire* to learn trades—not impress and enforce servitude on those who do not.

GRAVE CHARGES AGAINST THE AMERICAN INSTITUTE.

On another page will be found a communication from one of the exhibitors at the recent Fair of the American Institute, alleging that rival exhibitors who received premiums were managers or officers of the Institute. If the managers can deny this allegation, our columns are open to them for the purpose; if they are not able to deny it, they are unworthy of their positions.

When the Institute invites rival manufacturers and inventors to present their articles before it for competition, it is most clearly with the understanding that the merits of the articles shall be judged by an impartial tribunal. What manufacturer would go to the great expense and inconvenience of transporting heavy machinery to the Fair, and operating it there, if he knew that his competitors were to sit upon the committee that had the power of awarding the premiums?

No man with a proper sense of personal honor would consent to occupy a position in which he would be required to adjudicate between himself and others. Whenever a judge has a case come before him in which he has any interest, however slight or indirect, he refuses to try it. The late decision of the Supreme Court of this State in regard to the liability of National Banks to taxation, was unanimous with the exception of one judge, who declined to give his opinion, on the ground that he was an owner of stock in a National Bank.

Unless the American Institute can clear itself from all suspicion of interested bias in its awards—its premiums, its Fairs, and the Associatien itself, will be regarded with universal contempt.

WHY RENTS ARE SO HIGH.

By our exchanges we see that the cause of the high rents in nearly all cities is the subject of much discussion, and many editors are abusing landlords for asking such exorbitant rates. This abuse is childish and ridiculous. Every one of these editors would, if in the place of a landlord, act precisely as the landlord does; that is, from a number of desirable tenants he would take the one who offered the highest rent. As human nature is constituted, all prices must adjust themselves by the relation of supply and demand. The principal cause of the present high rate of rents is very plain.

In the first place, rents should be nominally forty-six per cent higher than usual, in common with other values, because they are expressed in a currency which is depreciated to this extent. Secondly, there is sufficient reason why the inflation of the currency should operate to raise rents more in proportion than other values. If a capitalist considers the project of building a house to let, he sees that a ten-thousand-dollar house will cost him at the present time at least fifteen thousand dollars, thus involving a loss of five thousand dollars whenever the currency is restored to specie va'ue—a loss equal to five years' rent. This consideration has operated for the last four years to such an extent as almost to suspend the erection of buildings. As the population of the country during the same period has continued its rapid growth, with not even a perceptible check from the war, the demand for houses has outrun the supply, and the natural and inevitable result is an advance in rents.

It is curious to observe how inflation of the currency in a civilized community extends its disturbing influence into all the relations of life.

INCREASE OF WEALTH.

The wealth of the world, ever since the creation of man, has been increasing more rapidly than the population; it is increasing at the present time more rapidly than ever before; and in the new States of this Union it multiplies more frequently than any where else. As one instance, we give the following statistics in relation to the State of Michigan, showing the population, the wealth, and the average property to each inhabitant at different periods:—

Year.	Population.	Valuation.	Wealth per capita.
1840	212,267	$37,883,024	$178
1850	397,965	74,968,344	188
1860	751,110	262,785,750	399
1865	820,000	319,872,305	390

The increased rapidity in the accumulation of wealth is not the result of the discovery of gold mines in California and Australia, but is owing to the larger employment of labor-doing machinery, and to the increase of intelligence, economy and thrift among men. The discovery of gold mines, by diverting a small fraction of the labor of the world from the production of wealth to the useless task of augmenting the currency, had a very slight tendency to check accumulation.

RENEWAL OF THE "WINOOSKI" AND "ALGONQUIN" TRIAL.

The trial between the engines of the *Winooski* and those of the *Algonquin* was renewed on the 23d ult., and continued till 2:10 P. M., on the 25th, when Mr. Dickerson ordered the *Algonquin's* engine to be stopped. In the morning before the engine was stopped, the counters showed, at the same time, 59,328 revolutions of the *Winooski's* wheels, and 60,566 of the *Algonquin's*, making 1,238 revolutions in favor of the *Algonquin*.

Mr. Dickerson has published a note giving his reasons for stopping. He says that it was agreed that the throttle of the *Winooski's* engine should be kept open throughout the trial, and that the engineers were evading this agreement by throttling off with the stop valves.

He says also:—

"The *Winooski* has gained an advantage of more than half a turn a minute by reason of losing her buckets in a collision with a coal barge—a collision that was permitted to take place with a knowledge that it must strip off buckets, and so give a great advantage to the *Winooski*, and which might have been prevented by stopping the engine for a moment."

Mr. Danby, President of the Board of Experts, before whom the trial was being made, has published a note in reply to that of Mr. Dickerson. He says:—

"About three or four hours before he stopped his engine, which was losing ground rapidly, Mr. Dickerson addressed the note in question to myself and the other two members of the Board of Chief Engineers, demanding the stop valves of the boilers of the *Winooski* to be carried wide open, with a threat that he would stop his engine in case it was refused. Mr. Isherwood, in order to save the delay and great expense to the Government of repeating this trial, at once waived his right, and the stop valves were placed wide open. After they were opened, Mr. Dickerson ran his engine about an hour, when, finding he was losing at the same rate as before, he abruptly stopped his engine, and so foiled the purpose of the experiment.

"Further, since the stoppage of the *Algonquin's* engine the *Winooki's* has continued running about twenty-four hours, with the stop valves wide open, and with equally as good results as with them partially closed.

"During the last thirteen and a half hours the *Winooski* had gained 597 revolutions upon the *Algonquin*.

"About forty-eight hours before Mr Dickerson stopped his engine, a large coal barge belonging to private parties was drifted by the powerful ebb tide, into the starboard wheel of the *Winooski;* but the damage extended no further than to fracture and splinter the projectiug outer ends of the paddles.

"Soon after this accident happened—which was entirely unavoidable—Mr. Dickerson was given his choice whether the trial should be stopped or whether he preferred to go on. He examined the wheel carefully and the performance of the *Winooski's* engine, both before and after the accident, and preferred to continue—running forty-eight hours—when, seeing he was rapidly losing, he makes it an additional excuse, in his letter, for his wholly unwarranted conduct in stopping."

M. REGNAULT has succeeded in obtaining photographs with bromide, iodide and fluoride of copper; the bromide proved the most sensitive.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Apparatus for Making Extracts from Tan-bark, Etc., by Means of Exhaust Steam.—The object of this invention is to utilize exhaust steam from steam engines, for the purpose of making extracts from tan-bark and other materials. The invention consists in the arrangement of a box with perforated sides and bottom, in combination with the pipe which conducts the exhaust steam to the vat containing the bark or other material to be extracted, in such a manner that the steam is free to expand and made to condense partially as it passes from the exhaust pipe into said box and all back pressure on the piston is avoided, and, at the same time, the full benefit of the action of the steam on the bark or other material is obtained. S. W. Pingree, of Lawrence, Mass., is the inventor.

Cross-plate Fire Surface for Steam Boilers.—The object of this invention is to increase the heat-transmitting power of the interior or heating surface of all kinds of steam boilers. Experience has shown that the mere providing of a large heating surface is not sufficient to transmit the heat generated in the furnace to the water; when the products of combustion are carried through flues or tubes, the lineal currents pass at right angles to the line of transmission of heat through the plate, the cylindrical mass of air is not equally heated from axis to periphery; while the temperature of the external stratum in contact with the metallic surface of the tube may be sufficiently lowered, the temperature of the interior portion, or cone, will remain nearly the same when it leaves as when it enters the tube. It is, therefore, evident other means must be found than the tubular system, in order to effect an improvement in the construction of the interior surface of steam boilers. To accomplish this is the object of this present invention, and for that purpose it consists in the construction of fire-boxes, flues, or tubes of any desired shape or dimension, with ribs projecting into the tube or flue and also into the water, which ribs have a spiral direction and diminish near the bottom of the flues so as to leave the same smooth to facilitate cleaning. The heated gases in passing through the flues or tubes must follow the spiral direction of the ribs, which continually break them up and cause them to mix so as to successively present fresh particles to the metal. The projecting ribs also vastly increase the heat-absorbing and conducting capacity of the surface, and enable a boiler of greatly reduced dimensions to supply a comparatively large amount of power. These tubes, flues, and fire-boxes, for all sizes of marine and land boilers, are made of cast iron in a peculiar manner, so that their strength will exceed that of the best boiler-iron flue or fire-box without stays, and as the heat-transmitting power of cast iron is to wrought or sheet iron plates as 66 to 39, it is obvious that cast iron is the proper metal for the flue or fire surface of boilers, while wrought iron is the natural metal for the outer shell by virtue of its superior tensile strength. Licenses to manufacture steam boilers, as well as all information on the subject, can be obtained from the inventor, Joseph A. Miller, engineer, No. 58 John street, and No. 614 Broadway, New York.

Machine for Cutting Moldings.—This invention relates to a new and useful improvement in the feed mechanism for cutting moldings, these in which pressure rollers are employed for feeding the stuff to its work. The invention consists in the employment or use of universal joints, applied to the shaft of the lower feed roller, in connection with a swinging frame, in which the shaft of the upper feed roller is placed, and with gearing for operating said machinery, the whole being so arranged that the bed on which one of the cutter shafts is fitted may be adjusted higher or lower, to suit the thickness of the molding to be cut, without at all affecting the operation of the feed rollers; the latter performing their function equally as well, whether thick or thin moldings are being cut, and without requiring any special adjustment to compensate for the variation of the thickness of the moldings. H. B. Smith, Lowell, Mass., is the inventor.

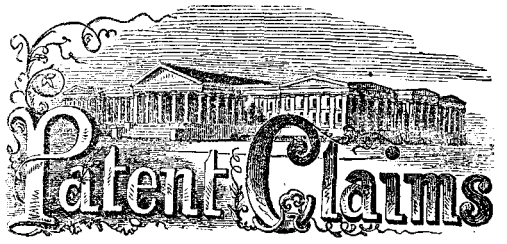
Wheel for Vehicles.—The tires of the wheels of vehicles are very liable to become loose, owing to the shrinking of the fellies of the wheel and the hub, and, more frequently, to the penetration of the ends of the spokes into the fellies and hub. When the tire of a wheel becomes loose, from either of the above causes, it has hitherto been the custom to remove the tire, and either cut it, and remold it, and shrink it again on the wheel, or to contract the tire without cutting it, by upsetting it with a machine, many of which are patented for the purpose. Both of these plans are attended with considerable trouble and expense, which it is the object of this invention to avoid. This invention consists in applying to the spokes of a wheel a nut and sleeve and a screw, arranged in such a manner that the spokes may be expanded or lengthened at will, and the tire always kept tightly on the wheel. C. J. Crane, of Burr Oak, Mich., is the inventor.

Street-sweeping Machine.—These improvements are embraced in two Letters Patent, the first of which principally consists in arranging upon and along the outside of the driving wheels, and upon a common shaft, extending in the same direction with that in which the machine moves, a series of brushes or brooms, made of any material adapted to street sweeping, which brushes, as the machine is drawn forward, revolve in a plane at right angles to the same, so that by guiding the machine along by the edge of the curbstone the bushes are thus brought close to the same, consequently, as they revolve, sweeping or throwing out the dirt and other refuse matters in the street near and within a short distance of the curbstone, toward the central portion of the street, or, at least, a sufficient distance to enable any of the ordinary sweeping machines when afterward drawn over the ground to sweep them up into a wagon therefor, or into suitable heaps, to be easily and readily put into a dirt cart for their removal. And the second, in so attaching that portion of the machine containing the endless belt, upon and by which the dirt, as fast as swept up from the street, is conveyed to the dirt-box of the machine, that it can be readily detached therefrom, or placed thereon, at pleasure, whereby, when the dirt-box has been filled to its utmost capacity, or as much as desired, it can be then drawn away to any convenient place for depositing the dirt, without necessarily carrying with it the sweeping devices of the machine. Andrew J. Roberts, Boston, Mass., is the inventor.

Quartz Crusher.—This invention relates to certain improvements in that class of quartz crushers in which the crushing is effected between a stationary and an oscillating jaw, in combination with suitable crushing rollers. The invention consists in the arrangement of a sieve between the working jaws and rollers, in such a manner that the pieces of rock, on being discharged from between the crushing jaws and while passing over the sieve, are divested from all fine dust adhering to them, and the full benefit of the rollers is obtained, which is not the case if the pieces of rock, enveloped in dust as they are when leaving the jaws, drop directly between the rollers. In order to keep the surface of the rollers clean and prevent the dust adhering to their surfaces, comb-shaped scrapers are applied, which are adjustable, so that their points can always be kept in contact with the periphery of the rollers. M. B. Dodge, of New York City, is the inventor.

It was a curious freak of the late tornado in Minnesota that stretched the telegraph wires sixty feet. When found by a repairer, the wire, though disconnected from any main battery, was so charged with electricity that it communicated a severe shock nineteen hours after the storm had passed. It is supposed that the wire was so overcharged as to become red hot, and in that condition stretched by the sheer force of the wind.—*The Telegrapher.*

Chemical Science in Germany.—Such is the appreciation of chemical science in Germany, says an English journal, that at the present time two large chemical laboratories on the most complete scale are in course of construction at Berlin and Bonn, at the expense of the State. They will cost, it is said, nearly $400,000. The field open for chemical science in this country is very great, and we expect to witness a great revival of this important science.



ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING OCTOBER 24, 1865.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

50,546.—Window-blind Fastening.—A. C. Arnold, Norwalk, Conn.:

I claim the plate and attachments, A, the angular-shaped bracket D, pin, C, catch, G, all in combination, for the purpose described when depending on the lower sash being closed to make them effective, substantially as set forth.

50,547.—Rowlock.—M. L. Babb, Cape Elizabeth, Me.:

What I claim as my improvement is the slotted and bulbou headed spindle, c d, in combination with the cylinder, b.

50,548.—Apparatus for Generating Gas.—Joseph Bagot New York City:

I claim obtaining the necessary motive-power to drive the exhausters of gas-generating apparatus from the escaping waste heat of the retort furnaces, substantially as herein described.

50,549.—Envelope.—E. L. Barrett, Springfield, Ohio

I claim the herein-described expansion envelope, when constructed as specified, for the purpose set forth, being a new article of manufacture.

50,550.—Sheep Rack.—J. S. Beals, Alabama Center, N. Y.:

I claim the feed board, D D, connected to the sides of the rack, so as to turn thereon, in combination with the boards, E E, attached to the feed board, D D, by hinges or joints, substantially as and for the purpose set forth.

I further claim the revolving standards E, arranged and applied to the rack, substantially as and for the purpose specified.

50,551.—Apparatus for Utilizing Heat from a Furnace.—Silas Bennett, Newcastle, Pa.:

First, I claim the vertical air tubes, H, located in the air heating chamber of the furnace, and used to assist the draught of heated air into the distributing tubes, I I', etc, which lead from the furnace to the place where the heated air is to be utilized.

Second, So inserting the air tubes into the air heating chamber, in connection with, and immediately beneath, the distributing pipes above them, that the apartments of the house may be supplied directly and separately with air from the cold-air duct, substantially as described and represented.

Third, The additional air tubes, W, for the introduction of exterior air into the circulation, as described and represented.

Fourth, The arrangement, as described and represented, for conducting the heated air from the furnace to appliances or apparatus for generating steam for culinary or drying operations, baking, etc., whether or not the same be previously or subsequently used for warming apartments.

50,552.—Coke Oven.—Jacob Bowers, Connellsville, Pa.:

I claim placing the opening or doorway for discharging the contents of the oven below the level of the bottom of the oven, in combination with the moving bottom, so constructed and arranged as to make a passage from the interior of the oven to the doorway, when the bottom is tilted, and to close the communication when the bottom is shut down, substantially as and for the purposes herein set forth.

50,553.—Saw.—Ira S. & C. N. Brown, Westerly, R. I.:

First, We claim, in combination with a saw plate and removable tooth, a locking device, adapted to lock or fasten the tooth after being placed in position, and arranged to admit of the removal of the tooth without necessitating the removal of the locking device from the tooth or plate, in whichever it is situated, all substantially as herein described.

Second, We also claim the bolt, a, tumbler, B, and spring catch, c, or their equivalents, in combination with a removable saw tooth and a saw plate, substantially as and for the purpose herein set forth.

50,554.—Broom Head.—J. D. Browne, Cincinnati, Ohio:

I claim the mode of attaching the handle, and also securely fastening the clamp, as herein substantially set forth.

50,555.—Focusing Plate-holder.—S. W. Burcaw, Allentown, Pa.:

First, I claim the adjusting screws, b, in combination with the frames, A B, constructed and operating substantially as and for the purpose set forth.

Second, The springs or screws, or either of them, with or without plates, when used by means of an attachment to adjust the holder without moving the plate in the holder.

[This invention consists in the use of regulating screws, in combination, with or without springs, and with the frame holding the ground glass or focusing plate of a photographic instrument, in such a manner that by means of said screws the ground glass can be readily adjusted and brought into the proper focus without much loss of time, and with the greatest accuracy. It consists, also, in the application of protecting plates, in combination with the regulating screws and with the frame holding the ground glass, in such a manner that the operation of adjusting the ground glass can be effected without springs, simply by turning said regulating screws, and the screws are securely held in place, and not allowed to shift their position spontaneously.]

50,556.—Hand Stamp and Embossing Press.—William Burrows, New York City:

First, I claim the arrangement of a stationary guide, H, for an embossing stamp, and of a horizontally swinging printing stamp, in connection with one standard and bed plate, substantially as herein described.

Second, The opening, C, in the bed plate, A, arranged in relation with the swinging printing head, D, for the purpose and in the manner substantially as herein set forth.

Third, I claim the ink fountain applied directly to the printing head of a hand stamp, substantially as herein described.

50,557.—Horse Rake.—George E. Burt, Harvard, Mass.:

First, I claim the combination of the elevator, P, with the crank, r, and pitman, Q, constructed and operating substantially as described, for the purposes set forth.

Second, The combination of the arms, O O', with the bar, G, constructed and operating substantially as described.

Third, The combination of the tooth, E, with the block, d, and the pin, i, and the arm, D, for the purposes set forth.

Fourth, The combination of the cylinder, W, the bolt, r, and the arm, D, for the purposes described.

50,558.—Well Packing.—James Calkins and J. Fraser, Buffalo, N. Y.:

We claim a seed bag, E, closing the whole aperture of the well,

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and provided with a means for attaching and detaching a lowering and raising rod or its equivalent, substantially for the purpose herein described.

Second, We also claim the conical skeleton formed guide, G, in in combination with the rod, A, and bag, E, constructed and operating substantially as and for the purposes set forth.

Third, We also claim elevating the cone, G, and screw-connecting pin, f, so far above the the top of the bag as to allow the accumulation of sediment without detriment to said connections, substantially as set forth.

Fourth, We also claim the application to untubed wells of a movable seed bag placed between the oil-bearing series of rocks and the veins of fresh water, for the purpose of excluding the latter from entering the fissures which contain the oil, substantially as and for the purposes herein set forth.

50,559.—Car Coupling.—George G. Campbell, Janesville, Wis.:

I claim the application to the link and pin self-coupler of the metallic springs, a and b, substantially as and for the purpose set forth.

50,560.—Wind Guard and Air Heater for Lamps.—John B. Capewell, Gloucester, N. J.:

I claim the wind guard or air heater, C, substantially as herein specified and described.

50,561.—Method of Preparing the Surface of Porcelain to Receive Designs, Etc.—Joseph Cartisser, New York City. Antedated Oct. 14, 1865:

I claim preparing pottery ware, such as porcelain and other fine ware, in the manner substantially as above described.

[This invention consists in preparing the surface or surfaces of pottery ware so as to form designs thereon, and so that they will receive and retain delineations made by painting, drawing, and by the photographic art.]

50,562.—Arrangement of a Welding Furnace and Steam Boiler.—H. J. Davison, New York City:

I claim the arrangement of the two furnaces, C and D, flue, b, openings, g g, and side flues, f, substantially as and for the purpose herein specified.

50,563.—Quartz Crusher.—M. B. Dodge, New York City:

I claim the arrangement of the sieve, D, between the crushing jaws, B C, and crushing rollers, F, and in combination therewith, substantially as and for the purpose set forth.

50,564.—Railroad Switch.—George Douglass, Luzerne, Pa.:

I claim the chairs, C C constructed with transverse grooves, a, and recesses, d, substantially as shown, for the purpose of forming bearings for the rod, D, and forming guards or stops at one side of the switch rails, as set forth.

I also claim the rod, D, provided with projections, c, having ledges, d, on them, two or more, and arranged relatively with the chairs and switch rails, to operate substantially as and for the purposes specified.

I further claim the combination of the lever, E, and rod, F, with the rod, D, provided with the projections, c c, having ledges, d, on them, and the chairs, C C, constructed as described, all for the purpose set forth.

[This invention relates to a new and improved railroad switch, of that class in which means are devised for preventing the switch from casually moving out of proper position. The object of the invention is to obtain a switch of the class specified which may be operated or adjusted with the greatest facility, be strong and durable, and held firmly in position, so that it cannot casually or accidentally moved out of its proper place.]

50,565.—Machine for Millstone Dressing.—William A. Dryden and James H. Montgomery, Monmouth, Ill.:

We claim the carriage, E, provided with a vertically sliding frame, I, to which an adjustable pick, Q, is attached, and also provided with gearing to engage with a rack, F, on the frame or box, B, and with a crank pulley, or its equivalent, to operate the frame, I, all arranged in such a manner that by the turning of a single shaft, G, in the carriage, the pick will be operated and fed along to its work, substantially as described.

We also claim the giving of a positive motion to the pick through the medium of the crank pulley, J, and slide, g, when combined with the adjustable carriage, substantially as described.

We further claim the adjustable frame or box, B, placed on the base, A, and operated through the medium of the screw, C, or its equivalent, when said parts are used in connection with the carriage, E, having the pick, Q, attached, and all arranged to operate substantially in the manner and for the purpose set forth.

50,566.—Hinge.—S. R. Dummer, New York City:

I claim the guide, y, supporting the latch lever, r, between its pivoted point, and the locking point in the disk, m, substantially as described and represented.

50,567.—Lantern.—Rufus Dunham, Portland, Maine:

I claim the combination of the movable shade, B, the parts A and C, and the handle, E, as and for the purposes described.

50,568.—Press for Pressing Gunpowder.—Lammot Du Pont, Wilmington, Del.:

I claim the compressing of powder dust into cakes or slates, by pressure applied horizontally, substantially as and for the purpose herein described.

50,569.—Damper.—Albert E. Elmer, Springfield, Mass.:

What I claim is my improved damper, as consisting of the two perforated plates, A B, and drop valve or plate, C, made, arranged and combined together, and with journals, substantially in manner, and so as to operate as hereinbefore described

50,570.—Sugar Mill.—Pleasant Fitzgerol, Newport, Ky.:

I claim adjusting the crushing rollers by means of a single screw operating on springs, in such a manner, that through the medium of the rods and steps they will all be adjusted toward or from each other at the same time, substantially as described.

50,571.—Distilling Petroleum.—Huot Fleury, New York City:

I claim the new process of distilling and rectifying petroleum oil above described, taken all together, and of which the apparatus is only a necessary part.

50,572.—Amalgamator.—P. W. Gates, Chicago, Ill.:

First, I claim carrying the ores of metals to be amalgamated into a bath of liquid metal, to a point below the axis of the submerging device, by means of buckets which are so arranged about a shaft or axis that they positively hold the ore upon the submerger, until they have passed said axis a greater or less distance, and then cease to have any positive hold upon the ore, substantially as described.

Second, Dividing both the ore and amalgamating agent in the process of amalgamation by the means and upon the principle, substantially as herein described.

Third, The combination of buckets with a scroll conveyor or submerging machine, substantially in the manner and for the purpose described.

50,573.—Quartz Crusher.—P. W. Gates and D. R. Fraser, Chicago, Ill.:

We claim, First, A doublea-cting, oscillating crusher, C, which has its journals arranged below the center of a square, rectangular or any other geometrical figure, which would inclose its transverse section circumferentially, substantially as described.

Second, Constructing a double-acting oscillating crusher, C, which has its journals located as described, with a ridge, e, at its highest point for dividing the material to be crushed and ground in its passage into the machine, substantially as described.

Third, The arrangement, consisting of the yoke, G, which takes hold of both ends of the shaft of the crusher outside the bearings of said shaft, and is worked by one crank, the double-acting crusher and double-concave hopper, substantially as and for the purpose described.

50,574.—Propelling Apparatus.—Albert Gemunder, New York City:

I claim, First, A reciprocating frame or its equivalent, constructed and operating substantially as described.

Second, The employment, in combination with the said reciprocating frame or its equivalent, of two or more paddles, so arranged as that either may be used separately to drive backward or forward substantially as set forth.

Third, The employment of two or more paddles, operating in opposite directions) on each side of the boat, to be used separately, substantially as and for the purpose hereinbefore set forth.

Fourth, The combination of a pivoted paddle, with the above-described levers, or their equivalent for lifting such paddle out of the water during the forward stroke, in the manner substantially as herein before set forth.

50,575.—Machinery in Spooling Thread.—A. B. Glover, Yonkers, N. Y.:

I claim, First, In machines for spooling thread, the lever, O, constructed and operated substantially as above described, one arm of which carries one end of the main shaft, B, and another is engaged at certain times by a latch, N, as herein shown.

Second, I also claim the slide, I, constructed substantially as shown, in combination with a change plate, L, substantially as above described.

Third, I also claim the combination of the cam, g, with the slide, I, substantially as above described.

Fourth, I also claim the fingers, r r', in combination with the change plate, L, substantially as above described, the fingers being pressed continually against the plate by a spring, s, or other suitable device.

Fifth, I also claim the toothed wheel, h, in combination with the plate, K, of the swinging frame, substantially as and for the purpose above described.

Sixth, I also claim the shaft, G, with the cam, p, in combination with the lever, O, and latch, N, substantially as and for the purpose above described.

Seventh, I also claim actuating the brake, O', and bringing it against the pulley of the spindle at the instant of the disengagement of the latch, N, from the lever, O, substantially as and for the purpose above described.

[The object of this invention is to produce a spooling machine which will wind a spool of silk, cotton or other thread automatically and stop the instant the spool is full. Among other novel features in its construction, is the mode of disconnecting the spindle from the shaft or pulley which drives it; also a peculiar construction of a slide, the position of which determines the distance to be traveled by the thread guide in laying the courses of thread on the spool.]

50,576.—Rock Drill.—Edward J. Graham, Philadelphia, Pa. Antedated Oct. 6, 1865:

I claim the within-described tubular drill, having on its face sets of cutting edges, arranged substantially, as and for the purpose described.

50,577.—Coal Machine for Mining.—W. W. Grier, and R. H. Boyd, Hulton, Pa.:

We claim, First, The screw shaft, F, provided with the groove, t, in combination with the gear wheel, G, provided with the feather, c', arranged and operating in connection with the movable frame, as and for the purpose herein set forth.

Second, The drum, T, mounted on shaft, L, and cord, r, arranged to operate the movable frame, as shown and described.

Third, The wedge-shaped blocks, c' in combination with the stationary blocks, c, arranged to operate substantially as shown, for the purpose of adjusting the frame, E.

Fourth, The slotted standards, R, in combination with the cam, levers, s, or their equivalents, for the purpose of holding the frame, E, as shown and described.

Fifth, The arrangement of gearing, as shown, by which each series of three drills is operated independent of the others.

Sixth, Attaching the bits to the detachable stem or mandrel, v, as shown and described.

Seventh, Supporting the bits, by means of the guide bars, P and U, arranged as shown and described.

Eighth, The swinging frame, C, provided with the gear wheel, D, arranged to operate in combination with the operating mechanism, and the truck wheels, a, for the purpose of moving the machine, as herein set forth.

50,578.—Powder for Polishing.—Andrew Hamilton, Broad Brook, Conn., and James De Gray, Brooklyn, N. Y.:

We claim the preparation and use of pearl powder for polishing purposes, substantially as herein described.

Second, A mixture composed of pearl powder and whiting, either with or without other substances, substantially as herein described, for the purpose of polishing metals or other materials, or cleaning the teeth.

50,579.—Car Wheels.—John Harris, Marquette, Wis.:

I claim a car wheel constructed of two parts, B D, fitted one upon the other, and the inner parts keyed or otherwise secured firmly on the axle, substantially as and for the purpose set forth.

I further claim constructing the inner part or hub, B, of the wheel with a flange, a, and using in connection therewith a plate, c, bolted to the hub with or without the packing interspersed between, substantially as and for the purpose specified.

[This invention consists in constructing a car wheel of two concentric parts, one part being fitted on the other and arranged in such a manner that a car truck may pass over curvatures in the road without subjecting either the axles or the wheels to any undue strain, as a revolving movement is allowed the outer part of each wheel independent of its axle.]

50,580.—Letter File.—Jotham W. Hauxhurst, New York City:

I claim as an article of manufacture, the combination of the case, B, spring, n, and curved wires, C and D, with the point, e, and cavity, s, with the thumb piece, P, arranged in the manner, and for the purpose set forth.

50,581.—Steam Gage.—Charles F. Henis, Cincinnati, Ohio:

I claim, First, The combination and arrangement of the cage or guard, E, with the float, I, for the purpose set forth.

Second, The combination and arrangement of the screws, D, and K, and nuts M, and N, for the vertical adjustment of the cage and float respectively.

50,582.—Safety Pocket.—Gibbons G. Hickman, Downingtown, Pa.:

I claim a safety pocket closed by a spring catch, said catch being secured by a screw, substantially as herein shown and described.

50,583.—Symmetrical Drawing Board.—Charles D. Hillman, Louisville, Ky.:

I claim the above-described symmetrical drawing board, substantially as and for the purpose described.

50,584.—Fire Tongs.—Birdsill Holly, Lockport, N. Y.:

I claim, First, Constructing fire tongs with their blades and other parts composed of the two flanges, b b', connected together by the central perforated web, c, substantially as and for the purposes set forth.

Second, I also claim the broad circular bearings, e e, in combination with the skeleton blades, A B, and handles, A' B' substantially as and for the purposes described.

50,585.—Trace Fastening.—D. E. Holmes, Halifax, Mass.:

I claim the trace fastening herein described, the same consisting of the right angular slotted shaft or stock, c, and hook, r, placed loosely upon and over the same, the two being arranged and operating together, substantially in the manner, and for the purposes specified.

I also claim in combination with the above, the use of the spiral or other suitable spring, operating as and for the purposes specified.

[This invention consists in forming the ordinary trace-hook in two parts, which are so attached together that when the trace has been placed over the hook, the hook can then be sufficiently turned to bring it at right angles to the trace slit, where it is securely held until desired to unfasten the trace when turning the hook in the proper direction to bring it in line with the trace, the trace can be then easily removed therefrom.]

57,586.—Water-boiling Apparatus.—H. W. Horton, Hamburg, Mich.:

I claim, First, The chamber, B, when arranged in a boiling apparatus substantially as and for the purpose specified.

Second, The fire-box or pan, D, in combination with the chamber, B, and vessel, A, substantially as described.

Third, The combination of the vessel, A, chamber, B, pipe, C, fire-box or pan, D, substantially as herein specified,

[The object of this invention is to provide a vessel for boiling water without placing the same upon a stove or fire. And the invention consists in arranging within the lower part of any suitable vessel capable of containing water or other fluid a chamber having a draft pipe communicating with the exterior of the vessel, and in employing within said chamber a fire-box or pan which can be removed at pleasure, and in which a fire may be made for radiating heat which is caused to pass first through the fire-box, then back through the chamber for its entire length, and finally up through the pipe.]

50,587.—Umbrella.—Horace Hotchkiss, Plainfield, N. J.:

I claim an umbrella or parasol handle of wood or other elastic material, covered with metal, as described.

[This invention consists in the employment or use of a stick of wood or other elastic substance, covered with sheet metal, such as iron, brass or zinc, in place of the ordinary metallic tube generally used for umbrella and parasol handles with metallic frames, in such a manner that the operation of bracing the metal tube, can be dispensed with, and a stronger, lighter, and better handle is produced at less cost than the ordinary metallic handles.]

50,588.—Artificial Fuel.—Samuel D. Hovey, Chicago, Ill.:

I claim the production of artificial fuel, out of any combustible substance which can be improved by aggregation, by combining the same with glue, substantially in the manner and about in the proportion set forth.

50,589.—Scissors.—William Howard, Middletown, Ohio:

The application and use of the spring, A, and loose rivet, B, with the shear blades, arranged and operating in the manner, substantially as described.

50,590.—Deep Well Pumps.—Benjamin J. C. Howe, Syracuse, N. Y.:

I claim removing and replacing the cylinder or working chamber of a pump without taking up the tubing substantially as described.

I also claim the construction and arrangement of the hooks or projections, a a, with the groove, B, in the discharge pipe, substantially as described.

50,591.—Lantern.—John H. Irwin, Chicago, Ill.:

I claim securing a removable lantern top to the upper part of the guard, substantially as herein specified and described.

50,592.—Priming Metallic Cartridges.—Charles Jackson and J. G. Pusey, Providence, R. I.:

We claim a cartridge composed of the case, A, provided with the hollow conical point, a in combination with the disk, B, provided with the recess, o, and slot, c, substantially as shown and described

50,593.—Self-centering Chuck.—Silas T. Jackson, Sheboygan Falls, Wis.:

I claim, in combination with the movable jaws of a chuck, a differential screw, operating substantially as described, so as to form a self-connecting chuck, as set forth.

50,594.—Car Truck.—Charles F. Janriet, Aurora, Ill.:

I claim, First, Suspending the swing beam, E, from springs, F F, by means of hangers, H H, in combination with the straps, G G, and spring guides, I I, all operating substantially as described, for the purpose of admitting lateral movement and transferring the weight upon the swing beam to the axles, as set forth.

Second, Sustaining the swing beam, E, by means of a pair of suspenders, H, on each side of each spring, substantially as described.

50,595.—File-cutting Machine.—James Jervis, Baltimore, Md.:

I claim, First, The combination of the body of the regulator with the adjustable section, B, connected therewith, substantially as described, whether the latter presses directly upon the shape or through the intervention of the presser, a.

Second, The combination of the body of the regulator, the adjustable section, and the presser, a, hinged to the latter, substantially as described.

Third, Giving to the rotating bed a taper whereby the ability of the regulator to cause the rotation of the bed is made comparatively uniform throughout, and this whether the same bed is used for all shapes, or a separate bed is provided for each shape, or description of file.

50,596.—Fire Escape.—Charles J. Jones and Emma W. Jones, New Brighton, N. Y.:

We claim a ladder, composed of a series of frames, B, each containing one or more folding steps, b, provided with suitable stops, in combination with links, a, and bannisters, e, constructed and operating substantially as and for the purpose set forth.

[This invention relates to certain improvements in that class of fire escapes which are composed of a series of steps arranged so that they can be folded up and stowed away in a comparatively small space when not used, and when they are to be used they are thrown out of the window, the upper end being secured inside the building, and the steps in falling down arrange themselves in the proper position and form a ladder, by means of which persons can escape from a burning building.]

50,597.—Book Clamp.—Joshua W. Jones, Harrisburg, Pa. Antedated April 27, 1865:

I claim the combination of a stationary and movable jaw adjusted by screws, D and E, and worked by an eccentric in the manner before described. I do not claim the stationary and movable jaw, but the manner of working it by an eccentric, and adjusting it to suit the different thicknesses of the book, as before described.

50,598.—Machine for Turning Rim Bases of Cannon.—Edward Kaylor, Pittsburgh, Pa.:

I claim the combination of the shaft, a, carrying a revolving cutter, b, a planing tool, susceptible of feed motion to and from the center of its shaft, with the revolving and sliding pattern or forming block, g, moving at right angles to the shaft, a, and so shaped as to give to the cutter an irregular motion, for the purpose of planing or cutting irregular curved surfaces.

50,599.—Bolt-heading Machine.—Edward Kaylor, Pittsburgh, Pa.:

I claim, First, The use of V-shaped swages for forming the head of bolts in combination with cams for operating them, when so constructed and arranged as that each swage cam shaft shall have a separate bearing in the frame of the machine, and shall be operated by a cog wheel thereon, gearing directly into a central-driving gear wheel, instead of gearing into the cog wheel on either of the other cam shafts, substantially as and for the purpose hereinbefore described.

Second, The combination of the crab, b', and sleeve, d', with the cam projection, i', and post K', with a spring, e', or other device for pressing the sleeve and crab together, for the purpose of a self-acting clutch.

Third, The combination of the self-acting clutch, constructed substantially as described, connected with the pull y, y', by a rope or chain, and the pulley shaft, w, and pulley, y, with its rope or chain, for the purpose of alternately raising and dropping the hammer in the manner hereinbefore set forth.

50,600.—Tool for Cutting Washers.—Charles A. King and Otis A. Smith, Middletown, Conn.:

We claim a tool for cutting washers having either a fixed or adjustable center pin and one or more adjustable cutters, all arranged within the tool, substantially in the manner described.

[This invention relates to a new and very simple but useful tool for the cutting of washers from leather, etc.; and it consists of arranging within the shank of the tool, a center-pin and one or more cutters in such a manner that they can be adjusted with regard to each other, and according to the size of the washer to be cut, by revolving or turning the tool upon its center-pin in the material from which the washer is to be made.]

50,601.—Machine for Bending Wood.—Samuel U. King, Windsor, Vt.:

I claim the machine substantially as described and for the purpose specified, it consisting of the several series of jaw carriers, c d c c, connected together and with their supporting frame, by means

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as described, the stationary and movable jaws, f g, of such carriers, the mechanism for simultaneously operating the movable jaws relatively to the fixed jaws in manner as described, and finally, the mechanism for simultaneously actuating the jaw carriers, in manner as explained, the whole being arranged so as to operate on a snath, and bend it with a uniform longitudinal compression or contraction, and in other respects, as hereinbefore specified.

I also claim the combination of the adjusting screws, a', and the nuts, b2,b2, with the jaw carriers to which they are applied, and with the mechanism for actuating the jaw carrier so as to effect the bending of a snath in manner as described, the purpose of such screws and nuts, or the object to be effected by them being hereinbefore explained.

50,602.—Wood-bending Machine.—George Kriebel, Hosensack, Pa.:

I claim the hinged dogs, f, in combination with the mould, G, to which the wood to be bent and strap are fastened by a screw clamp, and with the feed screw, D, constructed and operating substantially as and for the purpose set forth.

[This invention relates to certain improvements in that class of machines for bending fellies, for which a patent has been granted to S. Moyer, March 20, 1860. In his machine, the stick of wood to be bent for a felly is laid into a metal strap, and fastened by means of wedges to a mold, and by imparting to this mold a transverse sliding motion, the metal strap together with the felly are forced round the same by the action of rollers, which are movable, and the position of which is changed as the operation of bending the felly proceeds. The invention which forms the subject matter of this present invention consists in the use of hinged dogs which catch behind suitable shoulders at the ends of the metal strap, and which cause the dampened clamp and felly to bend round the mold without requiring any change in their position.]

50,603.—Blacksmith Tongs.—Charles W. Le Count, Norwalk, Conn.:

I claim the tongs, constructed as and for the purpose described, or their equivalent.

50,604.—Lathe Dog.—C. W. Le Count, Norwalk, Conn.:

I claim, First, The attachment of a dog or carrier to the center chuck of a lathe by means of a ball and socket joint or its equivalent, substantially as and for the purpose herein specified.

Second, Furnishing the so attached dog with two set screws, R R, arranged on opposite sides and in line with each other, substantially as and for the purpose herein specified.

50,605.—Field, Fence, and Gate Combined.—John C. Lee, Seville, Ohio:

I claim the arrangement of the panel or gate, F, in combination with the morticed post, B, post, A, strips, d', slats, d, as and for the purposes set forth.

50,606.—Grinding and Polishing Saws.—William J. Lippincott, Pittsburgh, Pa.:

I claim, in machines for grinding and polishing long saws, the arrangement of a grindstone supported on adjustable bearings, so as to be raised or lowered at pleasure in the manner described, with a rest roller of small diameter, having its axis parallel to that of the grindstone, and with one or more pairs of feed rollers having pressure screws or their equivalent so as to hold and guide the saw in its passage under the stone, such feed rollers being geared together and also connected by gearing with the rest roller, and having a positive and continuous motion on their axes in such direction as to feed the saw plate forward either with or against the motion of the revolving grindstone, substantially in the manner and for the purposes hereinbefore set forth.

50,607.—Hoisting Apparatus.—Samuel M. Longley, Hudson, N. Y.:

I claim, First, The endless screw, J, and worm wheel, H, in combination with the different al or double rooved pulleys, F, G, and the suspended frame, A, substantially as herein described.

Second, In combination with the sheave or frame, A, I claim the guard or covering, f, constructed and operating in the manner and for the purpose substantially as herein described.

Third, The combination in one suspended frame of a differential pulley, F, G, a worm wheel, H, endless screw, J, and a disengaging device for throwing the endless screw out of gear, the whole operating substantially as herein set forth.

50,608.—Mode of Embossing Wood.—Henry May, Bridgeport, Conn.:

I claim the improved article of manufacture herein described, consisting of sheets or cross sections of wood, stamped or compressed into useful or ornamental forms, patterns, or devices, by applying the pressure and producing the device upon the end of the grain, substantially as set forth.

50,609.—Machine for Drawing Belts Together.—Edwin F. Miller, of Williamsburgh, Mass., and Bela Gardner, of Hampshire Co., Mass.:

I claim, First, The clamp, A or B, when constructed in the manner and for the purpose herein set forth.

Second, In combination with said clamp the screws, o p or o' p', for the purpose and in the manner described.

Third, The combination of the clamps, A B, screws, C D, bevel gears, g h k l, and shaft, P, when arranged and operating substantially in the manner and for the purpose herein described.

Fourth, Forming the grooves or flutes, e e, or their equivalents on the projections, f f', and corresponding flutes or grooves, s s, on the bed pieces, a a', in the manner and for the purpose described.

50,610.—Broom Head.—John A. Miller, Somerville, Ohio:

I claim the sheet-metal head, A D R m m n n, furnished with flanges, i, to receive a lock slide, B b, substantially as set forth.

50,611.—Cast-iron Boiler.—Joseph A. Miller, New York City:

I claim, First, The fire-box, B, with ribs or flanges, b, projecting inwardly and outwardly therefrom, substantially as set forth.

Second, The conducting pins, a a, projecting inwardly and outwardly from the shell of the fire-box or flue, substantially as set forth.

Third, The flue, c, with the oblique tapering ribs forming a portion thereof, as and for the purposes specified.

50,612.—Printing.—Charles N. Morris, Cincinnati, Ohio. Antedated April 24, 1865:

I claim, First, Producing lines of shaded metallic letters, or other characters of varying sizes, on cards and other advertising matter, substantially as described.

Second, Shading all the lines on a card or other advertising matter, or the majority of said lines, when the metallic covering, sizing, and the shades are applied, substantially as herein described.

Third, I claim the process herein described of making the impression which succeeds the ink impression and precedes the metallic impression, or covering with a stiff size in combination with other steps of the process herein given, all for the purpose set forth.

50,613.—Adjustable Stove Grate.—Rees Moss, Philadelphia, Pa.:

I claim the adjustable grate, F, with its projections, J, when the said projections are arranged at the edges of the grate, and extend beyond the same toward the sides of the fire place, and towards the spaces between the bars of the vertical grate, D, as and for the purpose specified.

50,614.—Mode of Sinking Wells.—Byron Mudge, Cortlandville, N. Y.

I claim the process or mode of constructing or sinking wells where no rock is to be drilled, viz.: driving a rod down to and into the water, under ground, withdrawing it, and inserting a pipe in its place, substantially as herein described.

50,615.—Thill Tug.—Thomas Neely and Charles Bishop, Tiffin, Ohio:

We claim, First, Applying a tug strap to a metallic eye, B, by passing a portion of the strap around said eye, substantially as described.

Second, A metallic tug eye, which is constructed with flanges, a a, and a tang, b, substantially as described.

50,616.—Door Bell.—C. S. Nickelson, Canton, N. Y.:

I claim, First, The crank arms, n and r, bolt or pin, m, and sliding bar, z, arranged, connected, and operating together, substantially in the manner and for the purpose described.

Second, The combination with the door plate, g, of the sliding or operating bar, z, having a handle, a', for actuating the hammer or hammers of the bell, f, said bar being connected with them through the devices described and arranged within the door plate, as specified.

[This invention relates to improvements in the mode of operating the hammers of bells, which are particularly applicable to door bells.]

50,617.—Suspended.

50,618.—Swing.—Lewis F. Noe, New York City:

I claim a swing with the bottom and back of the seat hinged together, with pendent ropes, A, and brace ropes, C D, arranged and connected with each other, and with the bottom and back of the seat, substantially as herein specified.

50,619.—Pipe Coupling.—James Old, Pittsburgh, Pa.:

I claim, First, Connecting a thin metal pipe to a section of screw coupling by screwing the former with the latter, and otherwise securing them, as hereinbefore described.

Second, Making the coupling for tubing of wells with a valve or valves constructed and arranged substantially as described, for the passage of gas or oil from the exterior to the interior of the tubing.

50,620.—Molasses Pitcher.—John A. Parise and C. W. MacCord, New York City:

We claim, First, The central pouring spout, B, fitted into the neck of the vessel, surrounded by a funnel-shaped or enlarged mouth or overflow receiver, f, and having an opening, d, for the return of the overflow to the vessel, substantially as and for the purpose herein set forth.

Second, The internal flange, g, around the mouth or overflow receiver, f, in combination with the central pouring spout, b, substantially as and for the purpose herein specified.

50,621.—Washing Machine.—Calvin Parsons and B. S. Dane, Rome Center, Mich.:

I claim the arrangement described, consisting of the roller, F, in the frames, E, and the rubber, H, operated by means of the cross bar, L, and guided by the bars, S, in the slots, G.

50,622.—Spiral Spring.—F. C. Payne, New York City:

I claim a spiral spring, composed of wire having a twist, substantially as herein specified.

50,623.—Cupola Furnace.—Abid Pevy, Lowell, Mass.:

I claim a cupola having parallel sides and plane ends, the sides being extended to the length desired, for any required capacity of furnace, and the blast being distributed uniformly along their whole length, but not at the ends, substantially as and for the purpose herein specified.

I also claim supplying the air to the wind chest of the tuyeres, through a pipe at each end of the furnace, each provided with a valve, so as to insure thereby a balanced and uniform blast through all the tuyeres, for the purpose herein set forth.

I also claim the construction and arrangement of the tuyeres, substantially as and for the purposes herein specified.

50,624.—Governor for Steam Engines.—T. R. Pickering, New York City:

I claim, First, The springs, S, composed each of two or more leaves, rigidly connected at their ends and centers, and combined with the sleeves, E and G, substantially as herein specified.

Second, The balls, I I, centrally divided into two parts, one of which is grooved to fit the spring, and the two secured together and made to clamp the several leaves of the spring by means of a central screw, O, substantially as herein specified.

Third, The guards, L L, constructed and attached to the balls, and operating in combination with the central spindle, substantially as herein described.

50,625.—Barrel Machinery.—G. W. Pierce, Holley, N. Y.:

In combination with the rotating platform, K, gear wheels, N O, carriage, I, and lever, Q, I claim the elevating device, H F G E, to raise the cutting device, D D' D'', automatically, when the wheel, N, is thrown out of gear with the pinion, O, to allow the barrel to be removed.

[This invention relates to a new and useful machine for cutting the staves of barrels or casks of a uniform length, forming the bevel or chime at the ends of the staves, and cutting the croze therein; all being constructed and arranged in such a manner as to perform the work very expeditiously, and in a perfect manner.]

50,626.—Apparatus for Making Extracts from Tan-bark. S. W. Pingree, Lawrence, Mass.:

I claim the boxes, G, with perforated sides, applied in combination with the exhaust pipe, D, and leach, A, or its equivalent, in the manner and for the purpose substantially as set forth.

50,627.—Sawing Machine.—Tapping Reeves, Albion, Cal.:

I claim the combination of the dog, n, on the traveling platform, and the shipping arrangement and clutch, or their equivalents, with a friction wheel, which drives the said platform, substantially as and for the purpose above described.

[This invention consists in an improved method of moving the feeding platform of an edging table.]

50,628.—Gas Burner.—Christian Ritter, Reading, Pa.:

I claim a sliding tube, A, of brass or any other suitable substance or material, open at both ends, the upper end being perforated, C, to slide over gas burners, in the manner described, for the purposes set forth.

50,629.—Street-sweeping Machine.—A. J. Roberts, Boston, Mass.:

First, I claim so arranging a series of brooms or brushes, either one or more, to and upon the outside of a suitable wagon frame, in the direction of its length, and so connecting their shaft or shafts to and with the driving or rear wheels thereof that as the wagon is drawn forward the said brushes or brooms shall be made to revolve at right angles, or nearly so, to the direction in which the wagon moves, substantially as and for the purpose specified.

Second, The combination of the angular or inclined horizontal brush shaft, u, with the side brush shaft, t, both provided with a series of suitable brushes or brooms, and arranged together and connected with the driving wheels of a wagon frame, substantially as described and for the purpose specified.

Third, In combination with the above and either, when used separately or together, the use of the horizontal broom shaft, g', substantially as and for the purpose specified.

Fourth, Hanging the frame in which the several broom shafts have their bearings, and all suspended in such a manner that their brushes can be raised from or lowered to the ground at pleasure, and can adjust themselves to the inequalities thereof, as they are revolved, substantially as herein above described.

Fifth, Attaching the driver's seat to and upon the outer end of a lever arm, B', turning upon a fulcrum, y', of the crane neck-shaped bar, E, and bearing by its inner end against a fixed, elastic cushion, or spring, Z', of the wagon frame, as and for the purpose specified.

Sixth, The use of the spring lever, w', having pulley, x, of the wagon frame, in combination with the driving belt or band, N, as and for the purpose described.

Seventh, Attaching the frames in which the broom or brushes used are fastened to their shaft, by means of one or more bent or other suitable metallic springs, for the purpose and substantially as described.

50,630.—Street-sweeping Machine.—A. J. Roberts, Boston, Mass.:

First, I claim so connecting the frame containing the sweeping devices, and the endless dirt-carrying belt or band, to the wagon or dirt-box of a sweeping machine that it can be readily detached therefrom, or attached thereto, at pleasure, substantially as and for the purpose specified.

Second, The combination of the axle ring, G, and ring, H, attached together and to the front wheels of the sweeping machine, and operating substantially as and for the purposes specified.

Third, The arrangement of the worm, g2, pinion, f2, and shaft, d2, lever handle, m, and lifting cords, c2, operating substantially in the manner described, for the purpose of opening and closing the bottom plates of the dirt-box, as specified.

Fourth, The combination of the hooked-shaped lever arms, W, with the fixed projecting plates, A', the arms being so connected to and with a suitable handle lever, S, through rods, v w, that by raising or depressing the said handle the hooked ends of the arms, w, will be correspondingly moved, substantially as and for the purposes described.

Fifth, The employment in street-sweeping machines of an endless dirt-carrying belt or band, made of india-rubber or any of its elastic compounds, and having suitable-shaped ridges, for the purpose described.

Sixth, Forming upon and along each of the interior surfaces or faces of the sides of the frame, M, a guiding groove or channel, S2, in and through which the endless belt, N, moves, for the purpose specified.

Seventh, Inserting between the bent metallic springs, by which the broom frames are fastened to their center shaft, and the said shaft an elastic cushion, d4, in combination with a set screw, f4, for the purpose and arranged as described.

50,631.—Churn.—Wm. Robinson, Bellefontaine, Ohio:

I claim, First, The combination of a driving device, applied to the bottom of the churn, with a hub, D, and tube, C', substantially as described.

Second, Extending the hub, D, and the upper end of the spindle, B, through the top of the churn cover, in combination with the tube, C', substantially as described.

Third, The radial blades e e, applied to a collar, g, which surrounds the central tube, e', and which, together with the blades, can be removed from the churn box at pleasure, substantially as described.

Fourth, The gathering paddle, h, applied to the removable collar, g, substantially as described.

50,632.—Machine for Pressing and Smoothing Photographs.—Daniel and John Rupp, New York City:

We claim our new and improved machine for pressing and smoothing photographs, etc., having its several parts constructed and arranged in relation to each other, and so as to operate together, substantially as shown and described.

50,633.—Dentist's Mallet.—J. N. Scranton, Bennington, Vt., and H. H. Parsons, Hoosick Falls, N. Y.:

We claim, First, The combination of the tool-holder, hammer, spring catch and spring, substantially as herein described, so that by pressing the tool or tool-holder, C, against a resisting object the hammer is forced back against the action of the spring, and then allowed to come down upon the tool-holder, and to produce a blow of more or less force.

Second, Making the tension of the spring, K, adjustable, substantially as herein described, so that the force of the blows of the hammer can be regulated.

Third, The inclined plane, m, in combination with the spring catch tool-holder and hammer, applied and operating substantially as and for the purpose set forth.

Fourth, Making the inclined plane adjustable on the case, A, substantially as and for the purpose described.

[This invention consists in a dentist's mallet, the blow of which is produced by the action of a spring, the hammer being made in the form of a rod of cylindrical or other suitable form, which is guarded in a suitable case, and subjected to the action of a spring. The inner end of said rod or hammer is opposite to the inner end of another rod, which forms the socket intended to receive the tool, said two rods being connected by a spring dog. When the tool is pressed on a tooth, or on the material to be used in filling a tooth, the hammer is forced back against the action of its spring, and at a certain point the dog is released and the hammer is allowed to come down with some force upon the tool holder, thereby producing the action of a mallet.]

50,634.—Track Cleaner for Railroads.—George C. Sharp, New York City:

I claim the combination of a platform on wheels with brooms or brushes, substantially as above described.

50,635.—Cotton Press.—William A. Shepard, New York City:

I claim the combination of the toggle joints or levers, e e and d d, or their equivalents, with the creeping or alternately moving beams, E E', and driving crank, or its equivalent, the whole arranged to operate in the manner substantially as described.

I also claim the employment, in combination with the driving gears and mechanism for moving the beams, E E', of sliding shaft, C, and permanently located driving pulley, B, as and for the purposes set forth.

I also claim the employment, in combination with the beams, ratchets and bolts, of levers, L, so arranged and connected with said bolts as to enable the operator to quickly drop the moving parts, as described.

50,636.—Scale Pan and Tunnel.—Asahel A. Smith, Boston, Mass.:

What I claim as my invention is the scale pan as made with the tunnel or tubular spout, arranged at one end of it substantially as described.

50,637.—Planing Machine.—H. B. Smith, Lowell, Mass.:

I claim the arrangement and combination of the universally jointed shaft, K L, feed roller, G, swinging frame, I, and gearing, M M N N, substantially as and for the purposes set forth.

50,638.—Washing Machine.—Hamilton E. Smith, Cincinnati, Ohio:

I claim the washing cylinder provided with alternate perforations and inwardly projecting pegs, whose extremities form collectively a regular polygon, for the purposes set forth.

50,639.—Swarm Indicator for Beehives.—Wm. W. Snell, Rushford, Minn.:

I claim the employment or use of an alarm or an indicator or signal of any kind applied to or arranged in connection with beehives in such a manner that in case of the swarming of a hive the diminution of the weight thereof produced by the egress of the bees will cause the alarm or indicator to be operated.

I also claim the tilting platform, A, in connection with the arm, D, lever, F, and the alarm, arranged to operate in connection with the hives substantially in the manner as and for the purpose set forth.

[This invention relates to a novel and simple device for giving notice when a hive of bees are swarming, and it consists in the application of an alarm, which may be constructed similarly to an ordinary clock alarm, to a tilting platform, on which two or more hives are placed so as to balance said platform, all being so arranged that when a hive commences to swarm, or shortly after, the platform will have its equilibrium destroyed, and the alarm consequently sounded.]

50,640.—Flour Sifter.—E. Spencer, Philadelphia, Pa.:

I claim a casing having a perforated bottom, in combination with a shaft having any desired number of inclined blades and a brush, a detachable perforated plate or sieve, B, and a detachable cross piece, C, the adjustable nuts, e e', for the purposes described.

50,641.—Treating Diseases by Condensed Air.—Othniel Stone, Rochester, N. Y.:

I claim, First, The employment or use of a condensed atmospheric bath, for the purpose of curing or treating diseases, as set forth.

Second, The purifier, R, constructed, arranged and operating in combination with the bath, substantially in the manner shown and for the purposes specified

Third, The employment or use of a variable escape valve, in combination with the condensed atmospheric bath chamber, substantially as and for the purposes set forth.

Fourth, The arrangement of the escape valve, V, in or near the bottom of the bath chamber, as shown, and for the purposes herein described.

50,642.—Device for Registering the Number of Shoes Soled by a Sewing Machine.—A. J. Tewksbury, Haverhill, Mass. Antedated Oct. 4, 1865:

I claim a device for indicating the number of shoes stitched on shoe-sole stitching machines, composed of one or more wheels, or their equivalents, operated by the motion of the rotating horn on which the shoe is stitched.

I also claim swinging catch, E, or its equivalent, operating as described, and for the purpose specified.

50,643.—Boring Apparatus for Artesian Wells.—John Thacker, New Lexington, Ohio:

I claim the horizontal shaft ending in a screw, by means of which the rope to which the drill is attached falls from the center of the shaft, in combination with a slack spool gaged by the set screw to pay out the rope. The shaft may be of wood or iron, as well also the screw

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50,644.—Sirup Boiler and Evaporator.—Lloyd Thomas, New Philadelphia, Ill.:

I claim the hollow grate bars on which the fire and fuel are placed, through which any liquids may pass, for the purpose of heating said liquids and for the preservation of the grate bars and the chambers which form part of the heating furnace, and boiling any liquids that may pass through them; also a skimmer that is placed at the top of chamber 2.

50,645.—Churn.—James Thompson, Vevay, Ind.:

I claim the dasher, L l l' l', formed and operating as set forth.

Second, The arrangement of pouch, I i, and drip-way, J.

Third, The pouch, I i, and drip-way, J, when combined with the notch, N, and key, O.

50,646.—Grinding Mill.—Charles T. Weston, Scranton, Pa.:

I claim, First, The universal joint, F F, constructed and arranged substantially as herein described, for supporting the bed stone, B, so as to make it self-adjusting.

Second, The combined bail and driver arranged on the spindle, in connection with the screw collar, to operate in the manner substantially as and for the purpose set forth.

Third, The tubular rod fitted into the upper end of the spindle and attached to a frame which extends over the runner, for the purpose of keeping said end of the spindle in a proper lubricated state, substantially as described.

Fourth, The intermediate plate, G', between the two plates, D G, of the universal joint, provided with pins, a' a', to fit into notches, b' b', in the plate, D, and having slots, c' c', made in it, to receive pins, d', on the plate, G, substantially as and for the purpose specified.

[This invention relates to a new and improved manner of hanging and arranging millstones, whereby the parallelism of the two stones will always be preserved, the pressure of the upper stone or runner, on the grain being ground, regulated as desired, and the spindle kept perfectly lubricated at all times without any trouble or difficulty whatever.]

50,647.—File-cutting Machine.—Milton D. Whipple, Boston, Mass.:

I claim, First, The combination of the lever, f, and elliptic spring, m, elongated journal boxes and rod, l, operating as described, and for the purpose specified.

Second, The combination and arrangement of the arm, n', cam, P, and spring, k', with the rod, l, for the purpose specified.

50,648.—Carriage-axle Box.—Frederick Wood, Bridgeport, Conn.:

I claim the forming of one or more partitions across the oil chamber recess, in the manner described, or in any other manner substantially the same.

50,649.—Applying Solutions to the Interior and Exterior of Oil Barrels, Etc.—James O. Woodruff, Auburn, N. Y.:

I claim the applying of solutions simultaneously to the interior and exterior surfaces of casks, barrels, etc., by placing the cask or barrel, in a suitable warm state, within a vessel, and forcing the solution into and around the cask or barrel, and ejecting the unapplied solution therefrom, by means of steam, substantially as herein shown and described.

[This invention relates to a new and improved process for applying solutions simultaneously to the interior and exterior of casks, barrels, etc., in order to render them air and gas tight, and effectually prevent loss of the fluid they may contain by the evaporation of the same. The invention is more especially designed for coal-oil barrels, but may be advantageously used in all cases where it is necessary to line or cover barrels with a substance that will prevent evaporation or a permeation of the fluid through the wood of the barrel.]

50,650.—Combination Rack for Printers' Use.—Richard Yeomans, Chicago, Ill.:

I claim the making and applying the notches or grooves in the manner and for the purposes substantially as described, in combination with the cross bars, having their ends provided with projecting transverse obtuse edges, or their equivalent round points or pins, for the purposes substantially as described, or any other arrangement embodying the same idea.

50,651.—Hydraulic Engine and Meter.—John S. Barden (assignor to the New England But Company), Providence, R. I.:

I claim as my invention the improved engine, substantially as described, the same consisting of the four cylinders, A A' B B', the two pairs of connected pistons, D D D D, and the eduction chamber, C, arranged as explained, in combination with the main shaft, H, or its equivalent, the valve chest, F, valves, G G, ports, b b b b, and mechanism to operate such valves by the piston, substantially in manner as specified.

50,652.—Letter or Invoice File.—Reinhold Bocklen, Brooklyn, N. Y., assignor to Henry T. Sisson, Providence, R. I.:

I claim, First, The employment of a spring which is disconnected from the cam, crank or eccentric of the axial rod of the binding flap, and applied to a letter file so as to operate in the manner substantially as herein described.

Second, The construction of the binding flap with a shoulder, and from said shoulder to its front edge with a curved form, substantially as described, and for the purpose set forth.

50,653.—Lantern Guard.—Thomas Brown, Jr., and Joseph L. Lowry (assignor to said Brown and James McLain, Pittsburgh), Pa.:

We claim the combination of the ribs, e, hooked or looped at their upper end to the cap piece and at their lower end to the bottom piece of the lantern, with the detached cut ring, f, when so arranged inside of the ribs as to force them outward, and thus tighten the ribs and draw the cap and bottom pieces of the lantern toward each other, with the glass between them, substantially as herein before described.

50,654.—Construction of Privies.—Elizur E. Clarke (assignor to Franklin N. Clarke), New Haven, Conn. Antedated Oct. 13, 1865:

First, I claim the combination of the chamber or reservoir, C, whether attached to the superstructure of the privy or not, with the vault, F, when they are so constructed and combined as to produce by the use of muck the deodorization of the night soil, etc., substantially as herein described.

Second, I claim the combination of the two bars or boards, a and b, with the toothed or spurred shaft, c, when they are so constructed and arranged as to support, pulverize and deposit the muck, etc., substantially as herein described.

Third, I claim the combination of the toothed or spurred shaft, c, with the chamber, C, and vault, F, when constructed, arranged and fitted for use substantially as herein described and set forth.

50,655.—Wheel for Axles.—C. J. Crane (assignor to J. F. Crane), Burr Oak, Mich.:

I claim the construction of the spoke cap, a, and screw rod, b, with the thimble, f, flange, e, and nut, d, arranged and operating as and for the purpose described.

50,656.—Car-brake Shoe.—Samuel D. Danfield (assignor to himself and Henry Wood), Philadelphia, Pa.:

I claim the metal sole, C, with its arms, c c', arranged to embrace the wooden shoe, A, and having holes to receive pins or bolts which pass through the said, block, all substantially as set forth.

50,657.—Seed Planters.—H. V. Davis (assignor to Daniel S. Perkins), Amherst, N. H.:

I claim the combination of the spindle, e, handle, d, the rods, g c, the stud, h, and the arm, b, applied to the charger and the lid, whereby both charger and lid may be operated simultaneously by turning the handle as specified.

I also claim the arrangement and combination of the auxiliary mouth or hopper w, with the hand seed planter constructed substantially as described, and for the purpose set forth.

50,658.—Transparent Composition for Tablets.—Henry J. Griswold (assignor to himself and Henry A. Clark), Boston Mass:

I claim the within described waterproof composition for tablets or other articles upon which a lead pencil is used, consisting of the ingredients in the proportions substantially as specified.

50,659.—Toilet Mirrors.—John Johnson, Saco, Me., assignor to himself and Howard Tilden, Boston, Mass.:

I claim the flexible and adjustable holder, carrying a mirror at each end, combined and arranged substantially as herein described and for the purpose specified.

50,660.—Low-water Detectors for Steam Generators.—Daniel C. Mead and Charles Maggi (assignors to Charles Maggi), Pittsburgh, Pa.:

We claim the combination and arrangement of the metallic expansion bar, rod or tube, inclosed in a case or tube, one end of which is closed, which enables us to protect said expansion bar from any direct contact with steam or water, substantially upon the principle and in the manner as herein set forth.

50,661.—Piston Packing.—James Myers (assignor to himself and Samuel N. Lightner, Alleghany City, Pa.:

I claim the combination of two or more metallic packing rings, d d', and the caps, c c, with the piston ring, a, having passages, e g e', connecting the groove or space back of one ring with the groove or space back of the other ring or rings, so that the steam entering from either side of the piston head back of one packing ring shall have free access to the space or groove back of the other packing ring or rings, substantially as hereinbefore described.

50,662.—Tanning.—James Price (assignor to John W. Tompkins and Stephen S. Tompkins, executors of James Tompkins, deceased, and John W. Tompkins), Edgefield District, S. C.:

I claim the use of the pine leaf in the form of a watery extract or decoction in the process of tanning either separately or combined with the bark or other tanning material, in the manner described, and for the purpose specified.

50,663.—Paper Collar.—Samuel C. Shaw (assignor to himself, F. O. Kendall and F. A. Marshall), Marlboro, Mass.:

I claim as an improved manufacture a paper collar made with the imitation of a cravat printed or formed on it, substantially as specified, or with the same and the two parts of the bow thereof projecting from the opposite ends of the collar, and provided with the locking slits, as set forth.

50,664.—Folding Table.—George G. Small (assignor to himself and Charles H. Drummond), New York City:

I claim so constructing and arranging a table top for tables that it can be increased or decreased in size by folding its central portion below the same, substantially as herein described.

[This invention consists in certain new improvements in the construction of tables, whereby its top can be readily made smaller or larger without detaching any portion of the same therefrom, the folding leaves being so arranged with regard to the table top that when desired to decrease the size of the table they can be folded together below its surface into a very compact shape.]

50,665.—Cider Press.—Charles H. Thomas (assignor to himself and Hermon Thomas), Milton, N. Y.:

I claim, First, A cider press, consisting of the platform, A, mounted on wheels, and provided with the stationary screw, B, and nut, C, arranged and operating as and for the purpose set forth.

Second, In combination with a press constructed as described, I claim the use of the sacking, as and for the purpose set forth.

50,666.—Rotary Engine.—J. T. Warren, Stafford, N. Y., assignor to himself and Robert A. Chesebrough:

I claim the partition plate or valve, D, combined and arranged with reference to the steam port, C, the exhaust port, F, and the piston, B, substantially upon the principle and in the manner herein set forth.

50,667.—Hand Saw.—Daniel Welch and William W. Armington (assignors to George E. Mitchell), Lowell, Mass.:

We claim the combination and arrangement of the collar, c, the recesses, a b, and the pins, e f, with the socket, c, of the handle, A, and with the shank, d, of the saw blade or tool, B, the whole being substantially as and for the purpose as hereinbefore described.

50,668.—Apparatus for Rectifying Alcohol.—Anastasie A. Foubert, St. Helier, England, and Jean Gustave Bequet, Paris, France:

We claim, First, The plate or diaphragm, A, Fig. 1, sheet, 2, allowing the direction of the alcoholic vapors to be changed whenever required, and at the beginning and end of each charge operated upon substantially as described, and for the purposes set forth.

Second, The slide valve, V, and clack valve, S, on one valve rod, T, Fig. 11, sheet, 2, by which the ports of the diaphragm, A, are opened, and the pipe, H, is shut, or vice versa, at one operation, for the purposes set forth.

Third, The primary condensers, P' and O, Fig. 2, sheet 2 and sheet 1, substantially as described.

Fourth, The self-acting regulator, sheet 3, for controlling the feed of steam to the retort, in combination with the chamber or recipient, A2, in which hot water is made to circulate, in order to prevent the alcoholic vapors from condensing, substantially as described, and for the purposes set forth.

Fifth, The indicator, G, sheet 1, which takes its supply of steam at the first bell plate of the column, B, below the diaphragm, A, by means of a cock, g, substantially as set forth.

Sixth, The cooling condenser, E E', Fig. 3, sheet 2, the worm of said condenser bing divided in two portions at the fifth coil, for the purposes set forth and in the manner herein described.

50,669.—Egg Boiler.—Prosper Malapert, Poitiers, France, and Edward A. Des Courtis, New York City:

We claim the application of a thermometer to an egg boiler for the purpose of indicating the temperature of the water, as herein specified.

50,670.—Breech-loading Fire-arm.—Johann von der Poppenburg, Birmingham, England. Patented in England Feb. 14, 1865:

I claim, First, The construction of the spring hinge of the movable charge chamber hereinbefore described, and illustrated in the accompanying drawings.

Second, The arrangement and combination of the parts described and represented for bolting down the charge chamber during the discharge of the gun.

Third, The construction of the snap bolt described and represented for holding the charge chamber in its place when shut down, as well as for assisting in bolting down the charge chamber for discharge; also the arrangement of parts for working the said snap bolt.

REISSUES.

2,095.—Composition for Slate-surface Blacking, Etc.—Isaac Newton Peirce, Philadelphia, Pa. Patented Feb. 10, 1863:

I claim the use of benzine or petroleum spirits and ground feldspar, or emery, or quartz, or other silica, in forming a real stone surface, making use of varnish to make it easier in application and render it more adhesive, and lampblack or other coloring matter for a coloring, substantially as set forth, constituting the surface, and its application in the manner and for the purpose specified.

2,096.—Curing Provisions.—Daniel E. Somes, Washington, D. C., assignee by mesne assignment of himself. Patented Nov. 13, 1860:

First, I claim constructing packing houses and other similar buildings and structures for the purpose of salting, curing, preserving and storing articles of food, hides and other substances, substantially in the manner herein set forth and described.

Second, Salting, curing and preserving ford hides, etc., in shafts and vaults excavated in the earth to a depth sufficient practically to attain the lowest invariable temperature of the earth at the place where they are sunk, as set forth, and for the purpose specified.

Third, Cooling such excavations and shafts by artificial means, in the manner and for the purpose set forth.

2,097.—Shirt-bosom Folder.—John Stevens, New York City. Patented Nov. 9, 1858:

I claim the tins or metal strips aforesaid, when arranged with an adjusting mechanism to admit of wide and narrow plait or plaits, varying in width, being formed with one and the same set of tins or strips, substantially as described, for the purpose specified.

DESIGNS.

2,208.—Emblematic Picture.—James F. Bodtker, Madison, Wis.

2,209.—Ornamenting Paper Collars and Cuffs.—B. W. Burnet, Madison, N. J., assignor to Henry R. Burnett, Morrisania, N. Y.

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[See Judge Holt's letter on another page.]

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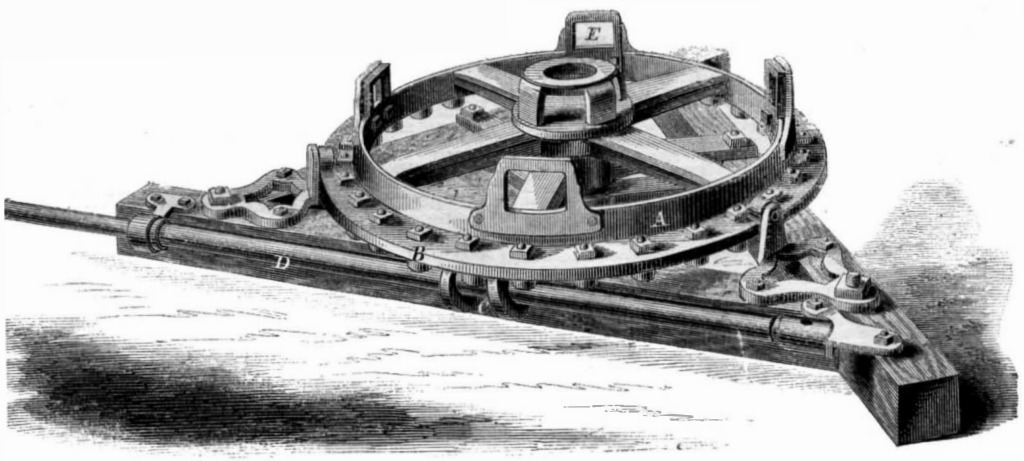
It consists in detail of a wheel, A, armed with pins, B, on which are friction rollers. These pins work against a helix, C, on the shaft, D, and, by pressing on the sides thereof, cause the shaft to rotate most rapidly.



SWEETLAND'S HORSE-POWER.

In the rim of the wheel, A, there are sockets E, cast, which carry levers not shown, and to these the horse is attached; any number can thus be accomodated by increasing the levers. The present machine is for four horses.

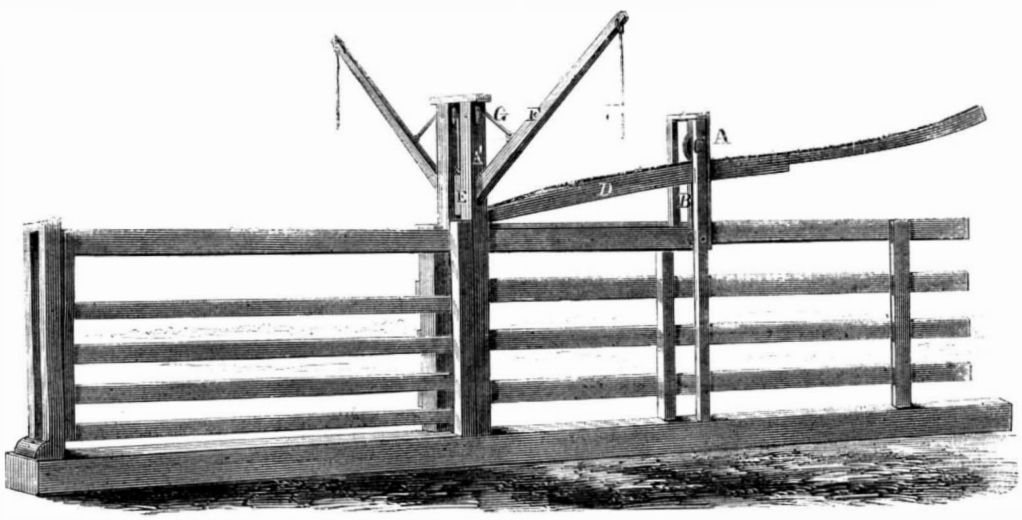
The frame of the machine is triangular, and shafts can be applied on three sides, so that work of different kinds can go on at the same time It is claimed to be one of the most efficient horse-powers in use, and capable of exerting the most force for its weight and size.

The construction of the machine is very simple and easily understood from the engraving without further comment.

For additional information apply to J. B. Sweetland, Pontiac, Mich. by whom it was patented through the Scientific American Patent Agency on July 4, 1865.

Improved Gate.

This gate is one of that class which can be opened by a person on horseback or from a wagon. By this plan the trouble of alighting is avoided. The operation is also much easier than in gates that have to be lifted bodily before they can be swung round.



GRENELL, BEZ & STOLL'S GATE.

In construction this gate is hung between uprights, A and A', and has a vertical arm, B, which is fitted with a roller, C. This roller runs on a lever, D. Between the upright, A', is a slide, E, to which the gate is hung and to which the levers, F, are attached by means of cords, G; a line, H, depends from the ends of the lever just mentioned, to pull them down by.

When the gate is to be opened, the line, H, is pulled down, which raises the slide and the gate. The latter then runs back on the lever, D, and is prevented from running off by the inclined plane at the end.

When the operator has passed through, the gate shuts itself, or if it should fail to do so can be started by elevating the opposite lever slightly, which will depress the slide so as to allow it to run down to the closing point.

This gate was patented through the Scientific American Patent Agency by S. Grenell, G. Bez, and H. C. Stoll, of Mokena, Illinois, on Sept. 5, 1865. For further information address Geo. Bez, Mokena, Illinois.

Expansion of Ice.

In *Silliman's Journal of Science* is a report of experiments made by Rev. Frederic Gardiner on the ice of the Kennebec river. By inserting a line of stakes in the ice across the river in the early part of February, he found, in the middle of March, that there had been an expansion of the ice of over twelve feet in a breadth of five hundred feet. As during this time the temperature of the water was nearly equal, the expansion must have been due to the sun's rays, which was proved by the fact that there was the least expansion on the eastern side, where the ice was partially shielded from the sun by a high bank.

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This sounds something like the school-boy's test of merit—"Whoever eats the most is the best feller." Try compressed molasses.—Eds.

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